

INVENTORY PLAN

NOXUBEE NATIONAL WILDLIFE REFUGE
Route 1, Box 142
Brooksville, Mississippi

Date Prepared
October 10, 1985

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INTRODUCTION

These inventory procedures represent a collective effort between the Noxubee staff, District Biologists Orr and Aycock, Refuge Manager Shell, and Migratory Bird Coordinator Bowers. The Refuge Manual and the Regional Office memo of April 10, 1985, "Wildlife Inventory Plans", were used as guidance.

ANNUAL SCHEDULE

The annual schedule represents estimates of staff days per month.

Procedure	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Mig. Waterfowl	9.0	9.0									2.0	9.0	29.0
Special Surveys													0.0
Wood Duck Production		30.0							10.0				40.0
Wood Duck Roost Ct.	3.0										1.0	1.0	5.0
Deer Herd Survey		1.0									2.0	2.0	5.0
Turkey Survey			1.0	1.0									2.0
Red-cockaded Survey						1.0							1.0
Alligator Night Ct.					2.0	2.0							4.0
Rookery Survey			1.0		1.0	2.0							4.0
Shore-Marsh-Wading				1.0					1.0				2.0
Raptor Inventory	2.0												2.0
Bald Eagle Survey	1.0												1.0
Christmas Bird Ct.											1.0		1.0
Refuge Fishery							4.0						4.0
Beaver Activity	1.0					1.0							2.0
TOTAL	16.0	40.0	2.0	2.0	3.0	6.0	4.0		11.0		5.0	13.0	102.0

ANNUAL COST

Procedure	Personnel	Equipment (Aircraft)	Other Supplies	TOTAL
Migratory Waterfowl	\$2,900	\$1,050	\$250	\$4,200
Special Surveys	0	0	0	0
Wood Duck Production	4,000	0	200	4,200
Wood Duck Roost Ct.	500	0	100	600
Deer Herd Survey	500	0	800	1,300
Turkey Survey	200	0	0	200
Red-cockaded Survey	100	0	0	100
Alligator Night Ct.	400	0	100	500
Rookery Survey	400	700	100	1,200
Shore-Marsh-Wading	200	0	0	200
Raptor Inventory	200	0	0	200
Bald Eagle Survey	100	0	0	100
Christmas Bird Ct.	100	0	0	100
Refuge Fishery	400	0	100	500
Beaver Activity	200	0	100	300
TOTAL	\$10,200	\$1,750	\$1,750	\$13,700

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge (NXNWR)

Procedure: Number 1

Species: Wintering Waterfowl (Anseriformes)

Title: Migratory Waterfowl (Winter)

I. PURPOSE

Migratory waterfowl is one of the major groups of birds for which the Fish and Wildlife Service is responsible. The refuge is an important wintering area for several waterfowl species that are of national concern (NSSE species), and it is important to monitor the status of these species. The refuge effort, when combined with other state/federal waterfowl inventories, provides an important national base of information used to determine the status of waterfowl. The refuge conducts a waterfowl hunt each winter, and population information is useful in managing the hunt as well as informing the hunters and public of recreational potential. This inventory is designed to estimate the number of wintering waterfowl on major wetland/use areas of the refuge and provide data that could be extrapolated to obtain an estimate of total wintering waterfowl on the refuge.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

During the key use months (December, January, February) preferably during the first week of each month, a simultaneous aerial and ground inventory will be made within the following areas: Bluff Lake, Loakfoma Lake, Prisock Moist-soils Unit, Green Timber Reservoirs #1, 2 and 3, Noxubee River from Highway 25 to Starkville Entrance Road, Jones Creek including GTR #4 (see attached map). Waterfowl seen by area and species will be recorded. Only actual waterfowl (ducks and geese) seen will be recorded on the tally sheets. (See attached tally sheets.) After the first year of combined ground and aerial counts, an expansion factor will be ascertained and used to estimate total refuge populations.

A biweekly ground count of key refuge waterfowl use areas will also be conducted during November, December, January and February. The location of biweekly ground counts is shown on Attachment 1. An observer will be stationed at each site, and waterfowl seen during the last 1.5 hours of daylight will be tallied.

At least once during the survey, a GTR will be chosen, and an attempt will be made to flush out the interior of the GTR while

the regular observers are conducting the usual waterfowl count. These data will be interpreted to see if a correction factor is feasible for GTR's.

Harvest data will be collected during all waterfowl hunts via use of a check station. All hunters will be checked out and data sheets filled out (sample attached). These harvest data will give a good reliable estimate of total waterfowl shot and hunter success per effort expended.

B. Data Analysis

Data will be used in output reports as well as the annual narrative. Waterfowl response to different type management efforts can be determined; green timber reservoirs, moist-soil management, agricultural fields, etc.

C. Data Filing

Data sheets will be filed in the refuge files under WILDLIFE: Birds-Winter Waterfowl Census.

III. SPECIAL CONSIDERATIONS

The same observers located at the same station should be used on all surveys.

IV. MANPOWER AND COST

Personnel	\$2,900
Equipment (aircraft)	1,050
Other Supplies	<u>250</u>
TOTAL	\$4,200

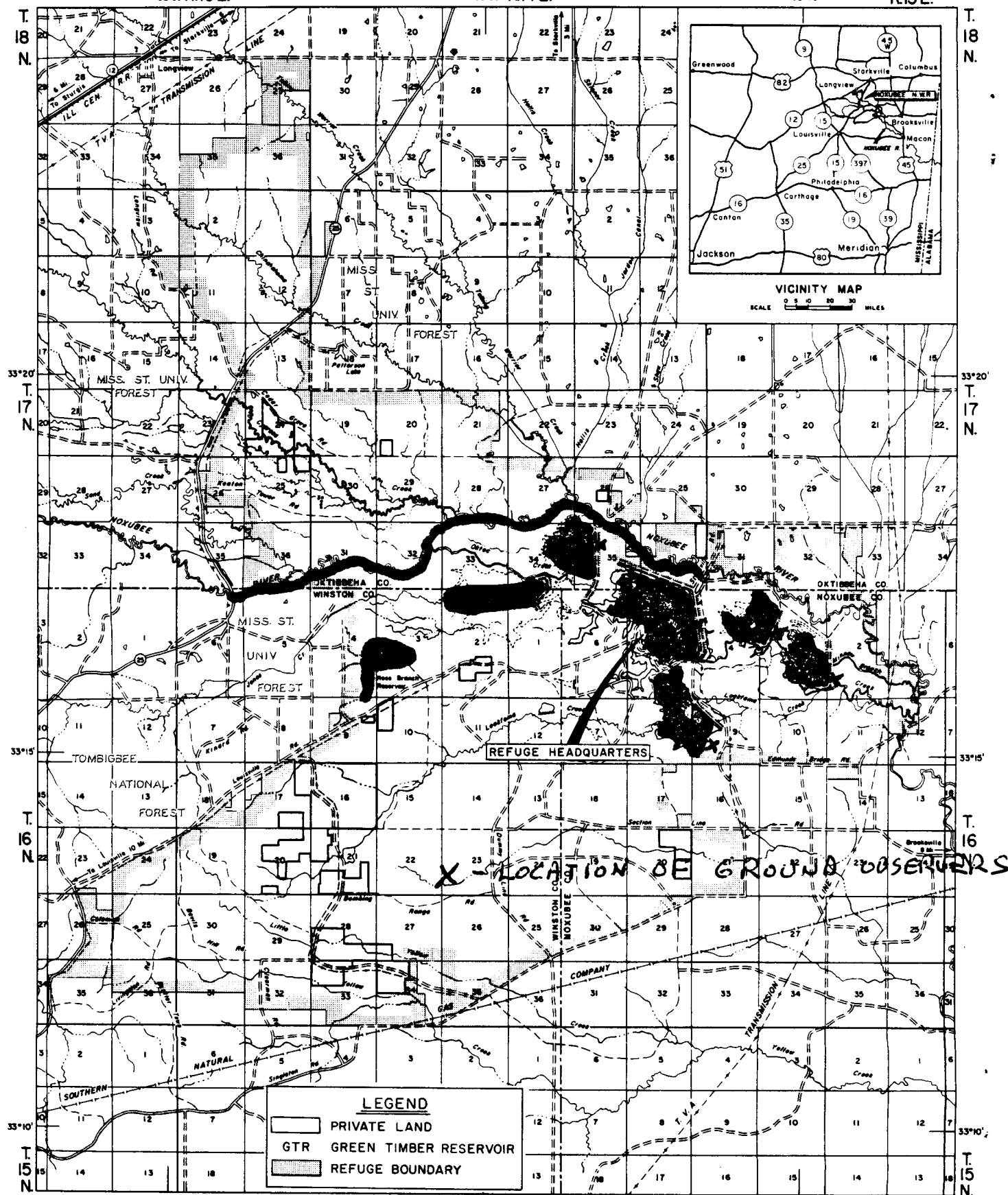
Prepared By: Jim Tidole Date: 10/11/85
Frank Bowen 10/15/85
Reviewed By: _____ Date: _____
Refuge Approval: _____ Date: _____
Regional Approval: _____ Date: _____

NOXUBEE NATIONAL WILDLIFE REFUGE

NOXUBEE, OKTIBBEHA AND WINSTON COUNTIES, MISSISSIPPI

UNITED STATES
DEPARTMENT OF THE INTERIOR
88°55' R.13E.

88°50' R.14E.

UNITED STATES
FISH AND WILDLIFE SERVICE
88°45' R.15E.R.13E.
COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY U.S.G.S. AND AERIAL
PHOTOGRAPHSATLANTA, GEORGIA
REVISOR: 2/80
DECEMBER, 1966

R.15E. 88°45'

MEAN
DECLINATION
1966

4R MISS 328 410

Area _____

Date _____

Mallard _____

Ring-neck _____

Gadwall _____

Teal _____

Scaup _____

Wood Duck _____

Redhead _____

Canvasback _____

Black Duck _____

Pintail _____

Shoveler _____

Mergansers _____

Others _____

Snow & Blue Geese _____

Canada Geese _____

Residents _____

Migrants _____

WEATHER _____

TIME _____

COMMENTS _____

Observer's Signature _____

NOXUBEE WATERFOWL BAG CHECK

DATE

[illegible]

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 2

Species: Waterfowl (Anseriformes)

Title: Special Surveys - December All Goose Survey
Mid-Winter Waterfowl Survey

I. PURPOSE

Each year the FWS and all states in the Mississippi Flyway conduct a coordinated mid-December all goose survey. Information from all sources (states, refuges, management areas, etc.) is pooled and used as an index to gauge the status of goose populations. These counts have been ongoing since 1969, and important trend information is obtained.

The Mid-Winter Survey is national in scope and has been run in some form for almost 50 years.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

1. December All Goose

This survey is conducted during the 5-day period beginning with the second Monday in December. It is important that the survey be performed during the prescribed period. Specific instructions and forms regarding data recording will be provided by the region's migratory bird coordinator through Wildlife Assistance personnel. A concerted effort should be made (ground or ground/aerial counts) to locate geese. Ground searches will be made at locations shown on attached map.

2. Mid-Winter Survey

This census will be in January as follows:

If the first workday in January falls on Monday or Tuesday, the census will be the first five workdays of the month. If the first workday falls on a Wednesday, Thursday or Friday, the survey will be the five workdays beginning the following Monday.

As with the Mid-December All Goose, specific instructions and forms will be provided by the region's migratory bird coordinator through Wildlife Assistance personnel.

The census will be as described in Procedure Number 1; a combined ground/aerial count.

B. Data Analysis

Data from both surveys are part of a larger effort and will be analyzed on a regional and national level. Refuge use of the data will revolve around reporting requirements and some direction of management efforts.

C. Data Filing

Data sheets for the December All Goose survey will be filed in refuge files under WILDLIFE: Birds-Geese (Mid-December Goose Survey); and sheets for the Mid-Winter survey will be filed under WILDLIFE: Birds-Winter Waterfowl Census.

III. SPECIAL CONSIDERATIONS

It is extremely important that resident and migrant Canada geese be reported separately.

IV. MANPOWER AND COST

Both these surveys will correspond to Procedures described under Procedure Number 1, and costs are included there.

Prepared By: Jim Tisdale Date: 10/11/85
Frank Bowen 10/15/85

Reviewed By: _____ Date: _____

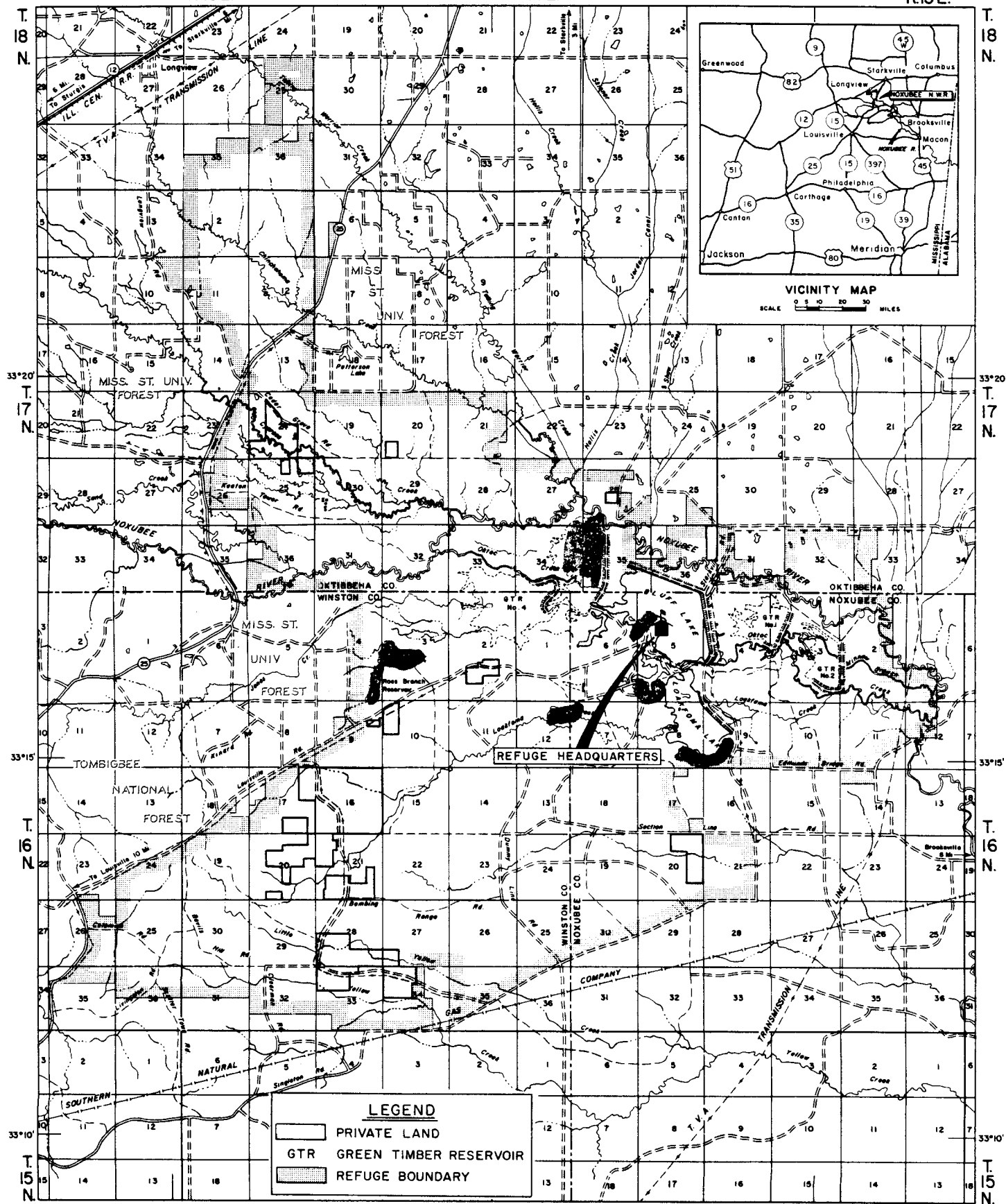
Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

GOOSE INVENTORY SEARCH AREAS NOXUBEE NATIONAL WILDLIFE REFUGE

 UNITED STATES
DEPARTMENT OF THE INTERIOR
88°55' R.13E.

NOXUBEE, OKTIBBEHA AND WINSTON COUNTIES, MISSISSIPPI

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88°45' R.15E.


R.13E.

88°55'

R.14E.

88°50'

R.15E. 88°45'

 COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY U.S.G.S. AND AERIAL
PHOTOGRAPHS

 ATLANTA, GEORGIA
REVISED: 2/80
DECEMBER, 1966

CHOCTAW MERIDIAN

5280 10560

21120 FEET

Scale 0 1 2 4 MILES


 MEAN
DECLINATION
1966

4R MISS 328 410

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge (NXNWR)

Procedure: Number 3

Species: Wood Duck (Aix sponsa (L.))

Title: Wood Duck Production (Nest Boxes)

I. PURPOSE

To document wood duck use of artificial nest boxes, record success, estimate young produced from boxes, and repair/replenish boxes.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

All nest boxes will be inspected annually between February and March to make repairs, replenish nesting material and record the number of useable boxes available prior to the upcoming nesting season. The location of boxes will be plotted on maps (topographic). In September another check of boxes will be made to record use and tally number of egg shells in each box. The number of useable (boxes in good condition) structures will also be recorded at this time (September). Data on the September box check should be recorded on attached form and filed. Notes on repairs that will be required will be made.

B. Data Analysis

Data will be used to determine the relative effectiveness of the wood duck box program. Also preference of one box type, effectiveness of predator shields, preference for certain locations, etc. can be ascertained.

C. Data Filing

Data sheets will be filed in the refuge files under WILDLIFE - Nesting Structures.

III. SPECIAL CONSIDERATIONS

Only two annual box checks are recommended. The February-March check is by far the most important. Wood duck boxes should not be allowed to stand where this February-March check cannot be made.

INVENTORY PLAN

IV. MANPOWER AND COST

Personnel	\$4,000
Equipment (aircraft)	
Other Supplies	<u>200</u>
TOTAL	\$4,200

Prepared By: Jim Tisdale Date: 10/11/85
Frank Laver 10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

ANNUAL NARRATIVE REPORT FORM
WOOD DUCK BOX PROGRAM INFORMATION

REFUGE: _____

NESTING YEAR: _____

	<u>NUMBER</u>	<u>PERCENT</u>
Total Usable boxes	_____	
Estimated boxes used by wood ducks	_____	_____
Estimated boxes used by other ducks	_____	_____
Estimated boxes used by other wildlife	_____	_____
Estimated wood duck broods produced	_____	_____
Estimated total wood ducks hatched	_____	
Estimated wood ducks surviving to flight stage*	_____	_____ *

Plans for next year (indicated number):

_____ more boxes

_____ fewer boxes

_____ no change

Remarks: _____

*If survival rate is other than 50%, please explain rationale in remarks section.

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge (NXNWR)

Procedure: Number 4

Species: Wood Duck (Aix sponsa (L.))

Title: Wood Duck Roost Count

I. PURPOSE

The wood duck is a NSSE species and usually ranks as an important species harvested by hunters. Although roost counts should not be used as a measure of trends for wood duck numbers, refuges should have an inventory of the number of roosts and bird density. Additionally, this specific roost inventory will be conducted during the mid-winter waterfowl survey, and the information used in the mid-winter data tabulation.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

Roosts will be located by staff observations during November and December. Many roosts are used year after year; thus former roost sites should always be checked.

Roost locations will be plotted on maps (see attachment) and birds using the sites will be counted as follows: During the mid-winter waterfowl census dates (but not necessarily on the same day as combined ground/aerial count), observers will be stationed at each roost site. Birds coming into the roost during the last 1.5 hours before dark will be tallied.

B. Data Analysis

Data will be used on the mid-winter inventory forms. It is also important to identify roost sites so they can be protected and possibly enhanced through management efforts.

C. Data Filing

Data sheets will be filed in the refuge files under WILDLIFE - Waterfowl Inventory.

III. SPECIAL CONSIDERATIONS

If the roost count is greater than wood ducks tallied during the mid-winter aerial/ground census, the ^{roost} number should be used on the mid-winter data forms.

INVENTORY PLAN

IV. MANPOWER AND COST

Personnel	\$ 500
Equipment (aircraft)	
Other Supplies	<u>100</u>
TOTAL	\$ 600

Prepared By: Jim Tidale Date: 10/11/85Reviewed By: Frank Bowen Date: 10/15/85

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

WOOD DUCK ROOST LOCATIONS

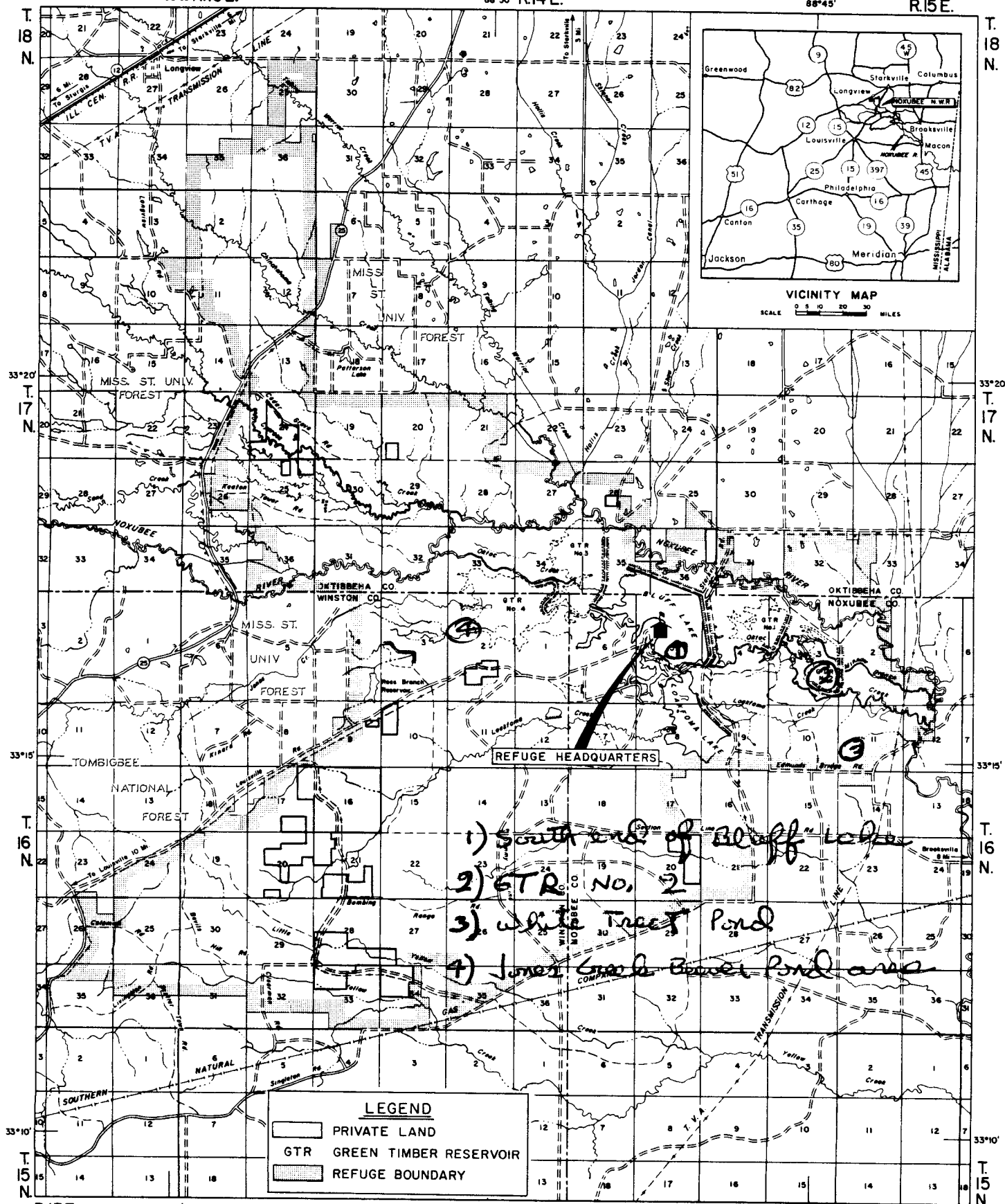
1984-85

NOXUBEE NATIONAL WILDLIFE REFUGE

NOXUBEE, OKTIBBEHA AND WINSTON COUNTIES, MISSISSIPPI

UNITED STATES
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CHOCTAW MERIDIAN

Scale
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0 1 2 4 MILES

R.15E. 88°45'

MEAN
DECLINATION
1966

4R MISS 328 410

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge (NXNWR)

Procedure: Number 5

Species: White-tailed Deer (Odocoileus virginianus virginianus)

Title: Deer Herd Survey

I. PURPOSE

The white-tailed deer is one of the more popular animals found on the refuge and draws interest from both hunters and non-hunters. The deer is also a species that has the potential to damage the habitat for itself and other species of refuge wildlife. To maintain the health of the refuge deer herd and keep the herd in balance with available habitat, it is desirable to control the deer population through public hunting. It is necessary to have adequate inventory information to properly manage the deer herd and monitor the refuge hunting program. With the intense interest in deer hunting from both hunters and non-hunters, it is also necessary to have sufficient biological information to support management decisions.

II. PROCEDURES AND DATA ANALYSIS

A. Procedure

It is not feasible to get a direct count of the refuge deer population. However, there are several proven techniques for monitoring deer herd health with a high degree of reliability.

Deer harvest data is one source of valuable information. To obtain this data, the refuge will operate a check station during refuge hunts (especially hunts capable of harvesting 50 or more deer). The check station will not be operated during archery hunts. During the gun hunts, the refuge staff will collect data on weekdays at the check station, located in the refuge maintenance area, and Mississippi State University will operate the check station on weekends and on holidays under a negotiated contract.

The following information will be collected on each deer brought to the check station: sex, age, field dressed weight, and the number of points and antler circumference of male deer and lactation of females. Obvious signs of disease, injury, etc. are also noted and recorded. A data collection form is attached.

B. Data Analysis

Mississippi State University, under a contract, analyzes the harvest data and submits an annual report detailing herd health,

population trends, any problems noted and recommendations for next year's hunting season. A copy of this report is submitted to the district biologist. A meeting is later set up between refuge manager, district biologist, state biologists and MSU to work out next year's hunting needs.

C. Data Filing

The annual report from Mississippi State University will be filed in refuge files under WILDLIFE- Animals-Deer.

III. SPECIAL CONSIDERATIONS

All personnel operating check stations will be competent in properly aging deer and gathering other data. Continuity of data from year-to-year is important and should be maintained through the annual hunt report process. If a herd reconstruction or projection technique is used, it is important to obtain as large a sample size as possible.

IV. MANPOWER AND COST

Contract with Mississippi State	\$ 500.00
Refuge check station costs and manpower	400.00
Costs and manpower to assist in herd health check	200.00
Costs and manpower to analyze data and prepare reports	<u>200.00</u>
TOTAL	\$1,300.00

Prepared By: Jim Tisdale Date: 10/11/85

Frank Bowen

10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

INVENTORY PLAN

NOTE #1:

In addition to the collection of harvest data, periodic deer herd health checks will be conducted in cooperation with the district biologist and the Southeastern Cooperative Wildlife Disease Study. These checks will involve the collection of five deer, aged 1½ years or older, during late summer. The number of abomasal parasites found in each deer will be determined. The APC is indicative of the nutritional carrying capacity of the refuge and will help make the refuge staff aware of the current nutritional status of refuge deer and help point to needed harvest levels. The deer will also be analyzed for other parasites such as lung worms or liver flukes. Blood samples will be taken from each deer and analyzed for EHD viruses, brucellosis, and other diseases. The Southeastern Disease Study will provide the refuge with a comprehensive report on the health of the deer sampled and make recommendations on population management (copy attached). Ideally, the deer herd health check will be completed once each three years. Scheduling problems or unforeseen wildlife disease problems may preclude the SECWDS from studying exactly on schedule. The deer herd health checks supplement the harvest data.

After the harvest data report is received, the refuge staff meets with personnel from Mississippi State University and Mississippi Department of Wildlife Conservation personnel to discuss the report and develop recommendations for the next hunting season.

INVENTORY PLAN

NOTE #2:

Some stations may want to consider a browse survey (Aldous method). This might be helpful to new stations that have little baseline data or stations that have only archery hunts or only small harvests. We would like to have at least two techniques as controls, i.e., harvest data/herd health or herd health/browse survey.

An annual deer hunt report will be prepared and submitted to the district biologist and the zone supervisor. It will summarize in narrative and tabular form data analyzation and will provide recommendations for the next year.

NOXUDEE NATIONAL WILDLIFE REFUGE
DEER HARVEST DATA 1983-84

Hunt Dates: _____

Type Hunt: _____

[illegible]

attachment 2

SCHOOL OF FOREST RESOURCES • AGRICULTURAL AND FORESTRY EXPERIMENT STATION
MISSISSIPPI STATE UNIVERSITY

Dale H. Arner, Department Head
Phone (601) 325-3830

DEPARTMENT OF WILDLIFE & FISHERIES
P. O. DRAWER LW
MISSISSIPPI STATE, MISSISSIPPI 39762-5917
PHONE (601) 325-3133

April 23, 1985

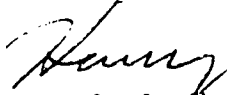
Mr. Jim Tisdale
Manager
Noxubee Wildlife Refuge
Route 1, Box 142
Brooksville, MS 39739

Dear Jim:

Enclosed please find the 1984-85 deer season report. I believe the deer population density at Noxubee is now close to being at an appropriate level. I have given my recommendation for deer harvest goals in the 1985-86 season. These are based on the number of deer checked last year and, of course, subject to error due to variation in hunter compliance with check station requirements from one year to the next.

It should not be considered a recommendation, but I have also outlined my personal preference for a deer tagging system that I feel would facilitate obtaining harvest goals. However, you are in the best position to consider all of the factors needed to devise a desirable management strategy for Noxubee deer hunts and as we discussed previously, there are many different alternatives possible.

Best regards,


Harry A. Jacobson, Professor
Department of Wildlife and Fisheries

HAI/mew

cc: Ray Aycock
Dan Cotton
Bob Griffin
Seth Mott

Evaluation of the 1984-85 Deer Harvest

Noxubee Refuge

Totals of 147 antlered and 100 antlerless deer were harvested (Table 1). This exceeded the previous year's recommendation for a maximum buck harvest of 100 and was insufficient to reach the recommended goal of 150 antlerless deer. However, the total harvest came close to the recommended harvest.

All condition indicators suggest the Noxubee deer herd remained in good health (Tables 2-4). Body weights were up in all age and sex classes except 1½-year-old does. Percent yearling spike bucks (43%) was at the lowest level it has been in seven years (Table 3). Lactation rates declined some in yearling does (from 33% to 23%) but remained almost the same for adult does (72% from 71%) as in the 1983-1984 season.

Age data continues to demonstrate overexploitation of bucks. Of 161 bucks killed in the 1984-85 season, 8.7% were fawns, 70.2% were yearlings, 18.6% were 2½ years old, and 2.5% were 3½ years or older. Number of deer harvested in each sex and age class is shown in Table 5. Age structure of the females harvested and the total number of males eventually harvested from each age cohort suggest the herd has had close to stable reproduction during the last three years.

On the basis of these data, I would recommend a harvest of around 250 deer. I again recommend implementing a restricted buck harvest. A goal of a harvest of 100 antlered and 150 antlerless is desirable to better balance herd age and sex structure.

A deer tagging system and restricted seasons may be required to achieve these goals. One alternative could be to issue each hunter a one-deer tag.

During primitive weapons season and bow seasons the tag could be good for either sex, and an option for a second antlered-deer-only tag given if the first deer checked is an adult doe. Youth hunts could be handled in a similar manner. If additional antlerless deer are required to meet harvest goals, a limited number of either sex tags could be issued for the second gun season. These tags would be good from any set date during the gun season until such time as harvest quotas were met. This would require that antlerless permit holders check the status of the antlerless season prior to each day's hunting. However, no administrative work load would be required other than posting of a daily sign that antlerless season is open or closed for permit holders. The same option of a second antlered-only bonus tag would aid in obtaining harvest goals for mature does. In this way, 1,000 or more either-sex tags could be issued without fear of over-harvest.

I should stress the above suggestion is only one of many potential alternatives for achieving desirable antlerless harvest goals. Special 1-3 day permitted gun hunts, as used in the past, are also possible but less likely to reach the desired harvest goal. I can think of no solution that will be universally acceptable to everyone. A single deer tag alternative will also not ensure a reduction in total buck harvest because there is no way of estimating how this will impact total hunting pressure. However, it would provide for increased overall hunter success rate because more people would have the opportunity to harvest a limited resource. It also should result in a reduction in buck harvest because some hunters holding either-sex tags will pass up opportunities to harvest an antlered animal initially in order to have the opportunity for the additional deer tag which would result from first harvesting a mature doe. Additionally, some hunters will pass up smaller antlered bucks because filling their deer tag would mean

loss of opportunity to kill a larger antlered trophy. Another alternative that could be used to ensure that harvest goals on bucks were not exceeded would be season closure after the desired quota was met. This alternative would be less desirable because it would reduce hunting opportunities.

If deer were required to be tagged prior to removal from the woods and hunters were aware that their future hunting opportunity will benefit from compliance with regulations, it should improve the data base on which future management decisions will be made. Further compliance could be ensured by requiring the return of all unused tags before a hunter would be eligible to obtain deer tags for the next hunting season. Special procedures could be developed for the reporting of lost tags.

Disadvantages of the above alternative include increased administrative workload in permit issuance and perhaps increased law enforcement effort. Some public resentment is likely from those hunters who object to reduced bag limits and more stringent regulations. However, this should be favorably balanced by improved public opinion from the majority of hunters who would benefit from increased opportunity for success and increased quality of the hunting experience.

Respectfully submitted,

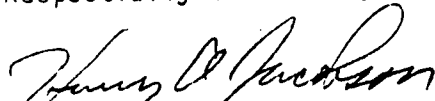

Harry A. Jacobson

Table 1. Deer harvest 1957-1984, Noxubee National Wildlife Refuge.

Hunting Season	Antlered Harvest	Antlerless Harvest	Total
1957-58	7		7
1958-59	18		18
1959-60	50		50
1960-61	103		103
1961-62	102		102
1962-63	185	133	318
1963-64	175	151	326
1964-65	128	229	357
1965-66	164	325	489
1966-67	173	226	399
1967-68	108	177	285
1968-69	141	156	297
1969-70	46	0	46
1970-71	100	401	501
1971-72	252	620	872
1972-73	159	79	238
1973-74	106	183	289
1974-75	68	25	93
1975-76	93	12	105
1976-77	87	10	97
1977-78	110	15	125
1978-79	174	46	220
1979-80	181	77	258
1980-81	252	592	844
1981-82	150	119	269
1982-83	180	119	299
1983-84	152	49	201
1984-85	<u>147</u>	<u>100</u>	<u>247</u>
Total	3,611	3,844	7,455
Average	129	137	266

Table 2. Average dressed body weights of white-tailed deer on Noxubee Wildlife Refuge 1973-1983
(Samples sizes indicated in parenthesis).

Hunting Season	6 mo.		1½		2½		3½+	
	♂	♀	♂	♀	♂	♀	♂	♀
1973-74	50 (56)	47 (43)	91 (70)	80 (33)	125 (32)	86 (35)	137 (4)	86 (14)
1974-75	51 (11)	48 (2)	91 (37)	75 (3)	107 (21)	84 (5)	126 (5)	83 (4)
1975-76	74 (10)*	40 (27)	98 (60)	--	130 (24)	76 (2)	152 (5)	--
1976-77			95 (26)		122 (9)		94 (1)	
1977-78	44 (6)		90 (23)	70 (1)	113 (10)	81 (1)	133 (6)	81 (1)
1978-79	45 (17)	32 (4)	88(107)	73 (12)	126 (65)	82 (9)	165 (1)	
1979-80	44 (15)	44 (18)	87(122)	75 (15)	117 (50)	80 (14)	131 (18)	81 (13)
1980-81	44(141)	41(139)	85(184)	71 (87)	113 (49)	78(104)	133 (19)	81(116)
1981-82	47 (34)	43 (29)	89(100)	71 (15)	113 (27)	80 (20)	127 (16)	81 (21)
1982-83	46 (30)	41 (24)	87(128)	70 (16)	115 (36)	77 (25)	135 (16)	84 (24)
1983-84	45 (15)	42 (12)	91(119)	77 (7)	112 (23)	83 (10)	126 (9)	80 (5)
1984-85	52 (11)	49 (20)	92(107)	76 (19)	121 (30)	84 (23)	142 (4)	89 (18)

*Apparently some 1½ year old deer were misaged as fawns by refuge staff, this would also affect average 1½ year old buck weights causing them to be slightly higher than actual.

Table 3. Vital statistics on 1½ year male deer, Noxubee Refuge 1975-1984.

Hunting Season	No Checked	Avg. Weight	Avg. No Points	Antler Beam Cir. (in.)	Characteristics Beam Length (in.)	% Spikes
1973-74	70	91	3.4	--	--	--
1974-75	37	91	3.4	--	--	--
1975-76	60	98	5.0	--	--	--
1976-77	54	95	3.5	2.3	8.4	43
1977-78	65	90	4.2	2.4	8.3	43
1978-79	110	88	3.0	2.2	9.4	62
1979-80	123	87	3.3	2.1	7.2	50
1980-81	184	85	2.9	2.2	6.5	80
1981-82	102	89	3.3	2.4	7.6	52
1982-83	128	87	3.0	2.3	6.6	58
1983-84	119	91	3.3	2.4	7.9	47
1984-85	107	92	3.5	2.3	7.4	43

Table 4. Lactation prevalence of does harvested Noxubee NWR
1979-1984.

Hunting Season	1½ Year Olds		2½+ Years Old	
	No. Examined	% Lactating	No. Examined	% Lactating
1979-80	16	6	34	59
1980-81	90	21	224	77
1981-82	15	13	47	55
1982-83	9	33	42	83
1983-84	6	33	14	71
1984-85	13	23	36	72

Table 5. Estimated number of fawns that were produced in each year, eventually harvested, and number of deer harvested by age class on Noxubee NWR 1973-1984.

	Deer Harvested								No. Deer Produced for Harvest ¹	
	Males				Females				Males	Females
	6 mo.	1½	2½	3½	6 mo.	1½	2½	3½+		
1973	56	70	32	4	43	33	35	14	112	46
1974	11	37	21	5	2	3	5	4	111	7
1975	10	60	24	5	2	0	0	0	97	3
1976	2	54	28	5	1	1	2	0	148	37
1977	5	65	33	12	3	4	0	3	176	137
1978	19	110	64	0	4	12	11	0	212	146
1979	17	123	41	17	17	16	6	21	244	152
1980	141	184	49	19	139	91	105	116	288	184
1981	34	102	27	21	29	15	20	21	189	64
1982	30	128	36	16	24	16	25	24	179 ²	56 ²
1983	15	119	23	9	12	7	10	5	128 ²	33 ²
1984	14	113	30	4	21	21	25	9	14 ²	21 ²

¹ Assumes a 4-year population turnover rate; i.e., deer surviving beyond 3½ are inconsequential to conclusions drawn from the data. This could induce considerable error in female estimates but would be generally valid for males because of the high exploitation rate.

² Data incomplete until additional harvest data added.

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 6

Species: Eastern Wild Turkey (Meleagris gallopavo)

Title: Turkey Survey

I. PURPOSE

The eastern wild turkey is a high visibility species that is receiving special attention by state wildlife agencies. Most states are presently involved in programs to restore turkey populations to areas that are void of turkey or have low populations. Because of this interest, it is desirable to have knowledge about turkey flocks on refuges.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

Hunters who harvest turkey are required to check the bird through a refuge checking station. At the checking station, the weight, beard length, spur lengths and area where killed will be recorded (see attached data form).

Observations of turkey by refuge staff, as well as other individuals, will be plotted on a refuge map throughout the year. This should provide a good indication of where the turkey flocks are located on the refuge and to what degree production was achieved. Consideration should be given to color coding the plotted points for such variables as years and sex (or unknown sex).

B. Data Analysis

These data will be used to gain some insight into this year's production. Other data are summarized and compared to past years' data to watch for any significant changes in the health of the flock.

C. Data Filing

Data sheets will be filed in the refuge files under
WILDLIFE - Birds-Turkey.

III. SPECIAL CONSIDERATIONS

It is difficult, if not impossible, to determine the number of turkeys on a refuge through population surveys. Determining the location

INVENTORY PLAN

of various flocks and an estimate of the number of birds in each flock will provide a minimum population estimate.

IV. MANPOWER AND COST

Personnel cost	\$200
Equipment (aircraft)	
Other supplies	_____
TOTAL	\$200

Prepared By: Jim Tisdale Date: 10/11/85

Frank Bowen

10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

TURKEY HARVEST DATA

1985

DATE	#	HUNTER'S NAME	# WEIGHT	" BEARD	SPURS		AREA
					Left	Right	
	1						
	2						
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
	13						
	14						
	15						

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 7

Species: Red-cockaded Woodpecker (Picoides borealis)

Title: Red-cockaded Woodpecker Inventory

I. PURPOSE

The red-cockaded woodpecker is an endangered species and a RRP species. It is a species of priority concern in the management of refuge uplands. In order to monitor the status of the RCW on Noxubee and to evaluate the effectiveness of refuge management for the RCW, it is essential to have an accurate inventory.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

The red-cockaded woodpecker utilizes older pine forests for nesting habitat. Nesting and roosting cavities are made in living pine trees. Active nest trees are characterized by a distinctive white resin flow caused by RCW's chipping resin wells out of the tree. An attached publication illustrates active and inactive cavity trees.

Dr. Jerome Jackson of Mississippi State University conducts an annual survey of RCW colonies on Noxubee NWR. The following techniques are used:

1. Each colony site is checked during the first two weeks of May to determine if the colony is active.
2. If a colony is determined active during the first visit and no nest is found, it is visited a second time during the last two weeks in May. Dr. Jackson bands the young when they are 7 to 10 days old.
3. If a colony is active the previous year but inactive the next, transects are run at 50-yard intervals on adjacent areas for 300 yards in an attempt to locate the birds.
4. During September and October, all active colonies are visited looking for unbanded birds.
5. Dr. Jackson depends on refuge personnel to locate new colonies during compartment inventories and other management activities.

6. At 2 to 3-year intervals, Dr. Jackson flies the refuge in an attempt to locate new colonies.

After Dr. Jackson completes field work for the season, a report is provided the refuge.

If Dr. Jackson would cease his activities on the refuge, the following technique is suggested:

1. A member of the refuge staff will visit each known colony site in early May and determine whether or not the site is active.
2. Both active and inactive trees will be plotted on maps or aerial photos.
3. The circle technique (copy attached), described in Wildlife Society Bulletin 11(4)1983, will be utilized to determine the number of active colonies on the refuge.

In the refuge office, all colony sites are plotted on a map which is updated annually.

B. Data Analysis

Location of active colonies and number of colonies (increase or decrease) are used in planning management activities, prescribed burning, timber harvest, firewood permits, etc.

C. Data Filing

Data summary sheets are filed in the refuge files under WILDLIFE - Endangered Species-Red-cockaded Woodpecker.

III. SPECIAL CONSIDERATIONS

IV. MANPOWER AND COST

Personnel Cost	\$ 100
Equipment (aircraft)	
Other Supplies	<hr/>
TOTAL	\$100

INVENTORY PLAN

Prepared By: Jim Tisdale Date: 10/11/85
Frank Bowen 10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

THE RED-COCKADED WOODPECKER: NOTES ON LIFE HISTORY AND MANAGEMENT

By
Robert G. Hooper, Andrew F. Robinson, Jr. and Jerome A. Jackson*

U.S. Department of Agriculture, Forest Service, Southeastern Area, State and Private Forestry, 1720 Peachtree Road, N.W., Atlanta, Ga. 30309

INTRODUCTION

The red-cockaded woodpecker was once a common bird in the mature pine forests of the Southeast. It lived from east Texas to Florida and north to Missouri, Kentucky and Maryland. Today, its range and population have been reduced through loss of habitat.

Unlike other woodpeckers, the red-cockaded roosts in cavities in live southern pines. It needs older pine trees for its cavities, and extensive pine and pine-hardwood forests to meet its foraging requirements. Much of the South has been cleared for agriculture or other incompatible uses. Much of the remaining pine forests are not suitable for the red-cockaded. Each year, more areas become unsuitable. Because of the drastic loss and continued decline of habitat, the bird is considered in danger of extinction.

In 1970, the red-cockaded was declared an endangered species. It now has the same protection given the better-known bald eagle and whooping crane. But protection alone is not enough. On Federal and State lands, forestry practices are giving the bird a better chance for survival by creating a favorable habitat. Other landowners can take positive steps to enhance its survival, especially if the red-cockaded already lives on their land. This publication describes the needs of the red-cockaded and outlines steps to aid the bird.

DESCRIPTION

The red-cockaded is slightly larger than a bluebird, about 7¼ inches (18.3 cm) long (figure 1). The back and top of the head are black. Numerous, small white spots arranged in horizontal rows on the back give a ladder-back appearance. The cheek is white. The chest is dull white with small black spots on the side. Males and females look almost alike, except males have a small red streak above the cheek. The red streak is rarely seen and then only with a powerful binocular in bright sunlight. Juvenile males have a small red patch on the very top of the head until fall.

All other southern woodpeckers of similar size have one or more of the following characteristics: conspicuous red on the head, a prominent white vertical streak on the back, a prominent white patch on the wing, or brown feathers.



LIFE HISTORY

Social Organization. – Among woodpeckers, the red-cockaded has an advanced social system. These birds live in a group called a clan. The clan may have from two to nine birds, but there is never more than one breeding pair. Young birds frequently stay with their parents for several months. The other adults are usually males called helpers. Some clans have no helpers, but others have as many as three. The helpers are typically the sons of the breeding male and can be from 1 to 3 years old. Young birds hatched in the spring disappear from the clan throughout the year, but a male sometimes remains with the clan to become a helper. The helpers assist in incubating eggs, feeding young, making new cavities, and defending the clan's area from other red-cockaded woodpeckers. A breeding male may live for several years. When he dies, one of his helper sons may inherit the status of breeding male.

The Colony. – A clan nests and roosts in a group of cavity trees called a colony. The colony may have one or two cavity trees to more than 12, but it is used only by one clan (figure 2). Cavities are made in live pines. Typically, within any colony, some cavities are still under construction (figures 3-5), some are finished and in use (figures 6, 7), and some have been abandoned (figures 9-13). In most colonies, all the cavity trees are within a circle about 1,500 feet (457 m) wide. In some colonies, all the trees are within 300 feet (9 m), but in others they may be ½ mile (.8 km) apart.

*See page 6

Each clan member tries to have a cavity for roosting. Only one bird roosts in a cavity. Birds without cavities in live trees often roost in scars on pine trees, in crotches between limbs or in cavities in dead trees. Red-cockaded birds with cavities defend them from other red-cockaded birds and other animals. Only the red-cockaded typically makes cavities in live pines, but 11 other birds, 5 mammals, 2 reptiles, and bees are known to use the cavities. Some animals use the cavity after it is no longer suitable for the red-cockaded. But others compete vigorously with the red-cockaded for its cavity. Some of the major competitors are the bluebird, red-bellied woodpecker, red-headed woodpecker, pileated woodpecker, and flying squirrel.

Nesting Behavior. - The red-cockaded woodpecker nests between late April and July. Only the breeding male courts and mates with the female. The female usually lays two to four eggs in the breeding male's roost cavity. Clan members take turns incubating the eggs during the day, but the breeding male stays with the eggs at night. The eggs hatch in 10 to 12 days. Nestlings are fed by the breeding pair and helpers. Adults bring food to the nest from up to 700 yards (640 m) away. Young birds leave the nest in about 26 days. Adults continue to feed the young after they leave the nest, but less so as summer progresses.

Feeding Behavior. - The clan spends much of its time looking for food as it travels about its territory. Most of the searching is concentrated on the trunks and limbs of live pine trees. There the birds scale the bark and dig into dead limbs for spiders, ants, cockroaches, centipedes, and the eggs and larvae of various insects. Repeated feeding visits are sometimes made to lightning-struck pines that are infested with beetles. The birds also spend time on cypress and hardwoods. Near farmland, they will feed on corn earworms. On occasion, they will eat fruits such as blueberry, sweetbay magnolia, wild cherry, poison ivy, and wax myrtle. They drink water from flooded holes in trees and from the ground.

The Territory. - The clan defends year round a territory surrounding the colony. Territories range from less than 100 acres (40.5 ha) to more than 250 acres (101 ha). The total area used by a clan can be as large as 1,000 acres (404.7 ha). A clan tries to keep other red-cockaded woodpeckers out of its territory, but will frequently trespass on its neighbors' territories. Defense can be mild encounters between clans, but at times fighting erupts with two opposing birds grasping each other's beak and falling to the ground.

Cavity Construction. - The red-cockaded woodpecker is the only bird that makes nesting and roosting cavities in live southern pines. Most other woodpeckers select dead trees or dead parts of live trees to make their cavities. These other birds

generally make new cavities each year and many do so in less than 2 weeks. The red-cockaded takes months and even years to excavate a cavity. Compared to dead wood, the sapwood and heartwood of the living pine is indeed tough. The abundant resin or pitch flow that occurs once the sapwood is penetrated creates another barrier. Seldom is a cavity completed in 1 year and most take several years of work. Generally, clans have several cavities under construction at the same time with some closer to completion than others. Many cavities that are started are never completed. Once completed, a cavity is used for several years.

The most intensive work on cavities occurs in summer after the young leave the nest. A bird may spend an hour or more excavating. Although work occurs any time during the day, most is in the morning. As fall progresses the birds spend less time working on cavities, and work essentially stops in winter. Spring sees a renewed interest in cavity construction. At this time, some clans show more interest than others and some defer cavity work altogether until the young leave the nest. Most cavities are between 20 and 50 feet (6.1 and 15.2 m) above ground. A few have been found over 60 feet (18 m) and some as low as 4 feet (1.2 m). Generally, the cavity is below any live limbs. It is common to find a tree with several cavities, but the birds may not use all the cavities at a given time.

Before a cavity is completed it is called a start hole (figures 3-5). A start hole progresses from a thumbnail size area where the bark has been removed, to a tunnel 6 inches (15.2 cm) or more into the tree. The tunnel is excavated at an upward slope so the resin or pitch will drain from the hole. The heartwood doesn't have flowing resin. Once the birds have tunneled through the sapwood and into the heartwood a sufficient distance, they excavate downward forming a gourd-shaped chamber about 6 to 10 inches (15.2 to 25.4 cm) deep and 3 to 5 inches (7.6 to 12.7 cm) wide. A bird sometimes roosts in a start hole before the chamber is fully developed.

Cavity Maintenance. - Before the cavity is completed, the birds flake away the bark several feet above and below the cavity entrance. The smoother surface possibly makes it harder for snakes to reach the cavity. Scattered about the trunk near the cavity entrance, numerous small holes called resin wells are chipped through the bark (figures 5-8). Resin flow from these holes eventually coats the trunk with pitch. Birds regularly peck at resin wells to stimulate resin flow.

The cavity entrance would grow shut if the birds did not remove the growing tissue from around the hole. In time, the birds expose the sapwood for several inches around the entrance. This exposed area is called the plate (figure 7). Pitch from the plate and resin wells thoroughly coats the trunk. From a distance, the cavity tree looks like a candle

(figure 2). Some observers think these so-called candles help the woodpeckers find their cavities. Others think the conspicuous trees serve as a territorial warning to alien red-cockaded. Another theory is that the resin deters predators - especially rat snakes. In one study, captive snakes actively avoided fresh resin and it appeared to be poisonous to them.

As long as a clan uses a cavity tree, the birds continue to scale the bark, chip the bark at the edge of the resin wells and plate, and enlarge the plate. On trees actively used for roosting and nesting, the pitch is clear and sticky, the freshly chipped bark around the resin wells and plate is reddish and the plate is light-colored. Once the birds stop using the cavity tree, the resin dries to a gray color, the plate becomes dull and weathered, and the bark at the edge of the resin wells and plate appears the same brownish color as the rest of the trunk (figures 9-13).

HABITAT REQUIREMENTS

Cavity Tree. - Red-cockaded woodpecker cavities have been found in longleaf, loblolly, shortleaf, pond, slash, pitch, and Virginia pines. Two cavities have been reported in cypress. Cavities are rarely found in trees as young as 30 to 40 years old and most cavity trees are twice that old. Studies from different parts of the South found the average cavity tree age ranged from 63 to 126 years for longleaf, 70 to 90 years for loblolly, 75 to 149 years for shortleaf, 62 to 130 years for pond and 70 years for slash pine.

The tree must have enough heartwood to contain the roosting chamber. A chamber in sapwood would fill with resin. Heartwood is quite hard, but a high percentage of cavities is found in pines infected with a heart rot fungus called red heart. This fungus weakens the heartwood and makes cavity excavation easier. Some cavity trees apparently do not have red heart, but these trees may have softer than

average heartwood. It is not certain if the red-cockaded needs red heart in order to make a cavity in the average pine.

Colony Site. - The colony site is the stand of trees containing and surrounding the cavity trees. A good colony site is a mature, park-like, pine stand with 50 to 80 square feet (4.6 to 7.4 m²) of basal area per acre (figure 2). Few or no hardwood trees should be above 15 feet (4.57m) high. When the hardwood mid-story grows to the level of the cavities a high rate of cavity abandonment occurs, leading eventually to loss of the colony. Likewise sapling pines growing near the cavity trees can also cause abandonment. A few widely scattered hardwood trees, and shrubs below 15 feet (4.6 m) do not harm the red-cockaded and are beneficial to other wildlife. However, hardwood understories rapidly grow into hardwood mid-stories unless control measures are taken.

An important function of the colony site is to provide a source of new cavity trees. Cavity trees are generally used for several years, but on the average, from 4 to 9 percent die each year. In addition, other cavities become unusable by the red-cockaded. The colony site should be at least 5 to 10 acres (2 to 4 ha) to ensure cavity trees for the future.

The red-cockaded does not always have the chance to select good colony sites. Some sites that appear normal to the inexperienced eye are actually close to being abandoned. In seeking trees suitable for excavation, the bird often uses relict trees that were left as seed trees, or as culls, or to mark property boundaries. Often, such sites lack a supply of future cavity trees. At other sites, the uncontrolled hardwoods rapidly crowd out the birds.

Foraging Habitat. - The best colony site is no good if an adequate foraging habitat is unavailable. Good foraging habitat consists of pine stands with trees 9 inches (22.9 cm) and larger in diameter at breast height (d.b.h.). The red-cockaded also forages in pole stands (4 to 9 inches d.b.h.), but little use is made of sapling stands (less than 4 inches d.b.h.). Clans regularly forage on pines scattered through hardwood stands, but pure hardwood stands are of little value to the woodpecker. The acreage of foraging habitat needed by a clan varies with the quality of the habitat. While 100 acres (40.5 ha) of mature pine is sufficient for some clans, where habitat conditions are not ideal, clans commonly forage over several hundred acres.

Clans sometimes continue to use a colony site when their territory has less than 100 acres (40.5 ha) of suitable foraging area. But, study suggests these clans have considerable difficulty raising young. It is not uncommon to find abandoned colonies surrounded by a lack of adequate foraging habitat. Control of mid-story hardwoods is essential in colony sites, but the red-cockaded commonly forages in pine stands with a well-developed hardwood mid-story.



Active cavity with plate and resin wells.

RED-COCKADEE HABITAT



Figure 1.-Red cockaded woodpecker.

Red-cockaded cavities are made in live pines. Figures 1-17 show live pines. Cavity trees in open, mature pine stands are preferred (figure 2), but pine seed trees and relict pines in young stands are commonly used. In pine stands with hardwood midstories, active cavities tend to occur above the hardwood crowns and where hardwoods are sparse. Hardwoods near the cavity typically lead to abandonment.



Figure 2.-Colony site. Note other cavity in center background.

CAVITIES UNDER CONSTRUCTION



Figure 3.-New start hole. Note 1-inch wide round hole and scaling.



Figure 4.-Advanced start hole, 2 inches wide. Note round hole, symmetrical excavation into sapwood and resin icicle.



Figure 5.-Cavity nearly completed. Note resin wells and icicle.

ACTIVE RED-COCKADEE CAVITIES



Figure 6.-Cavity 2 inches wide with numerous resin wells.



Figure 7.-Cavity 2 inches wide with plate and resin wells.

ACTIVE RESIN WELLS



Figure 8.-Close-up of resin well, 1-inch wide. Note red bark of active resin well.

Red bark on the edge of recently chipped resin wells and plate is a reliable sign a cavity is active (figures 5-8). A binocular is helpful. Caution: Look at the bark and not the resin - old resin sometimes looks red (figures 9, 10).

ABANDONED TREES

Abandoned cavity trees are clues active trees might be nearby. Resin dries and grays on abandoned trees. Bark at the edge of resin wells and plate turns brown or is hidden by dry resin. Red-cockaded woodpeckers rarely roost in abandoned cavities. Active and abandoned holes can occur on the same tree.



Figure 9.-Inactive start hole. Note dull sapwood and symmetrical hole. Red color is dried resin.

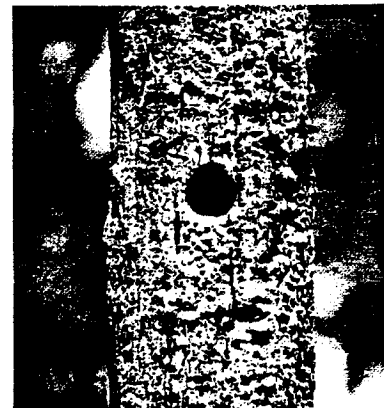


Figure 10.-Abandoned cavity. White resin covers resin wells and plate.



Figure 11.-Abandoned cavity. Note dull bark on resin wells and edge of plate. Reddish color on plate is dried resin.



Figure 12.-Enlarged cavity 5 inches wide. Note extensive coverage of old resin.



Figure 13.-Enlarged cavity 5x8 inches. Note old plate and resin wells.



Figure 14.-Yellow-bellied sapsucker holes 1/4-inch wide.



Figure 15.-Asymmetric feeding hole of pileated woodpecker.



Figure 16.-Branch hole. Note lack of icicle.



Figure 17.-Asymmetric tree wound with sparse resin flow.

MISTAKEN FOR RED-COCKADED

If a hole does not have one or more of the following it is likely not to have been made by a red-cockaded: symmetrical hole, scaling, icicle, resin wells, or plate. Look for positive signs of red-cockaded activity. Binoculars are often needed. Sapsucker holes are smaller and more regularly spaced than resin wells (figure 14). Pileated woodpecker feeding holes are generally asymmetric (figure 15) and, if they penetrate sapwood, are tapered and ragged. Resin flow is light and scattered compared to distinct icicle of start holes (figures 3-5). Pileated work is common in pine stands with dense hardwood cover. Branch holes lack an icicle (figure 16). Tree wounds are asymmetric (figure 17). **Caution:** Sapsucker holes sometimes occur on red-cockaded trees and red-cockaded can excavate cavities through branch holes. In both cases, positive sign of red-cockaded is present.

Nonetheless, the highest populations of the bird are on areas with active, prescribed burning programs for the control of hardwoods in pine stands. Also, territories tend to be smaller in areas with hardwood control.

MANAGEMENT SUGGESTIONS¹

Governing Factors. - The potential for managing privately-owned forests to provide a favorable habitat for the red-cockaded woodpecker depends on (1) goals of the owner (2) current condition and natural capabilities of the land (3) size of the forest (4) forest conditions on adjacent land (5) occurrence of the red-cockaded on the owner's land and adjacent lands.

Landowners who have a red-cockaded colony can do much to enhance its survival regardless of the size of their property. But, because the birds forage over large areas, forest conditions on adjacent land may ultimately determine the fate of a colony. On larger forests, particularly those 200 acres (80.9 ha) or bigger, the bird can be maintained with greater assurance. Each individual colony is important to the survival of the species, but large ownerships of several hundred or thousand acres have the potential of sustaining significant populations of this endangered species. Land that has little or no pine forests has little potential as a red-cockaded woodpecker habitat. On areas without red-cockaded woodpeckers, but with pine forests, improvement of the habitat may encourage the red-cockaded to move into the area.

Objectives. - A successful management plan for the red-cockaded woodpecker must do five things: (1) retain existing cavity trees (2) provide trees for new cavities (3) provide adequate foraging habitat (4) control hardwoods in the colony site (5) provide future colony sites.

Colony Site. - Defer harvesting of existing colony sites. If the colony is in a larger stand that will be harvested, designate an uncut 200-foot (61 m) buffer zone around each cavity tree. Leaving only the cavity trees is not adequate, as the buffer is needed to provide replacement cavity trees. Do not isolate colony sites from foraging stands of pole size and larger pines. The colony site should be surrounded by or directly adjacent to foraging stands.

Control of hardwoods in the colony site is vital. Do not allow hardwoods to exceed 15 feet (4.6 m) or so in height, especially within 50 feet (15.2 m) of cavity trees. In colony sites lacking past hardwood control, it may be necessary to remove hardwoods by cutting. Prescribe burning, when properly applied, is an effective means of controlling small hardwoods. When using fire, rake around the base of the cavity trees to remove litter and resin, otherwise the tree may catch fire and destroy the cavity.

Thin stands containing colony sites back to 50 to 80 square feet (4.6 to 7.4 m²) of basal area per acre. Leave the older trees for future cavity trees. Unless a safety hazard, do not remove dead or abandoned cavity trees as other animals may use them instead of the good cavity trees.

In colony sites infested with southern pine beetles, the infested trees, except cavity trees, may be cut and removed, burned or sprayed with an approved pesticide. Do not use pesticides (such as organophosphates) toxic to vertebrates.

Foraging Areas. - Manage the available acreage as a foraging habitat. Favor pine stands on suitable sites. Plant pines at a 10x10 foot or 12x12 foot (3x3 m or 3.7x3.7 m) spacing to aid rapid stand development. Birds continue to use seed tree areas for foraging until seed tree removal. Regeneration areas of 10 to 30 acres (4 to 12 ha) have less impact on the bird than larger ones. Avoid isolating colony sites from foraging areas when regenerating stands. Thinning of sapling and pole stands improves diameter growth and opens up stands to a condition more suitable to the woodpecker. Control hardwoods by prescribed burning.

Rotation Age. - In general, the longer the rotation age, the greater the opportunity the red-cockaded has to maintain existing colonies and to create new ones. The minimum rotation age necessary to provide an adequate number of cavity trees to sustain a viable population of Red-cockaded is not known. As a safe minimum, the National Recovery Team recommends 100-year rotations for longleaf and 80-year rotations for other pines. Some opportunity for cavity replacement is provided by shorter rotations of 80 years for longleaf and 70 years for other pines, but it is not certain if these rotations can supply an adequate number of cavity trees. When it is not feasible to have long rotations over the entire ownership, leaving small, scattered stands of older pines will benefit the bird.

THE AUTHORS

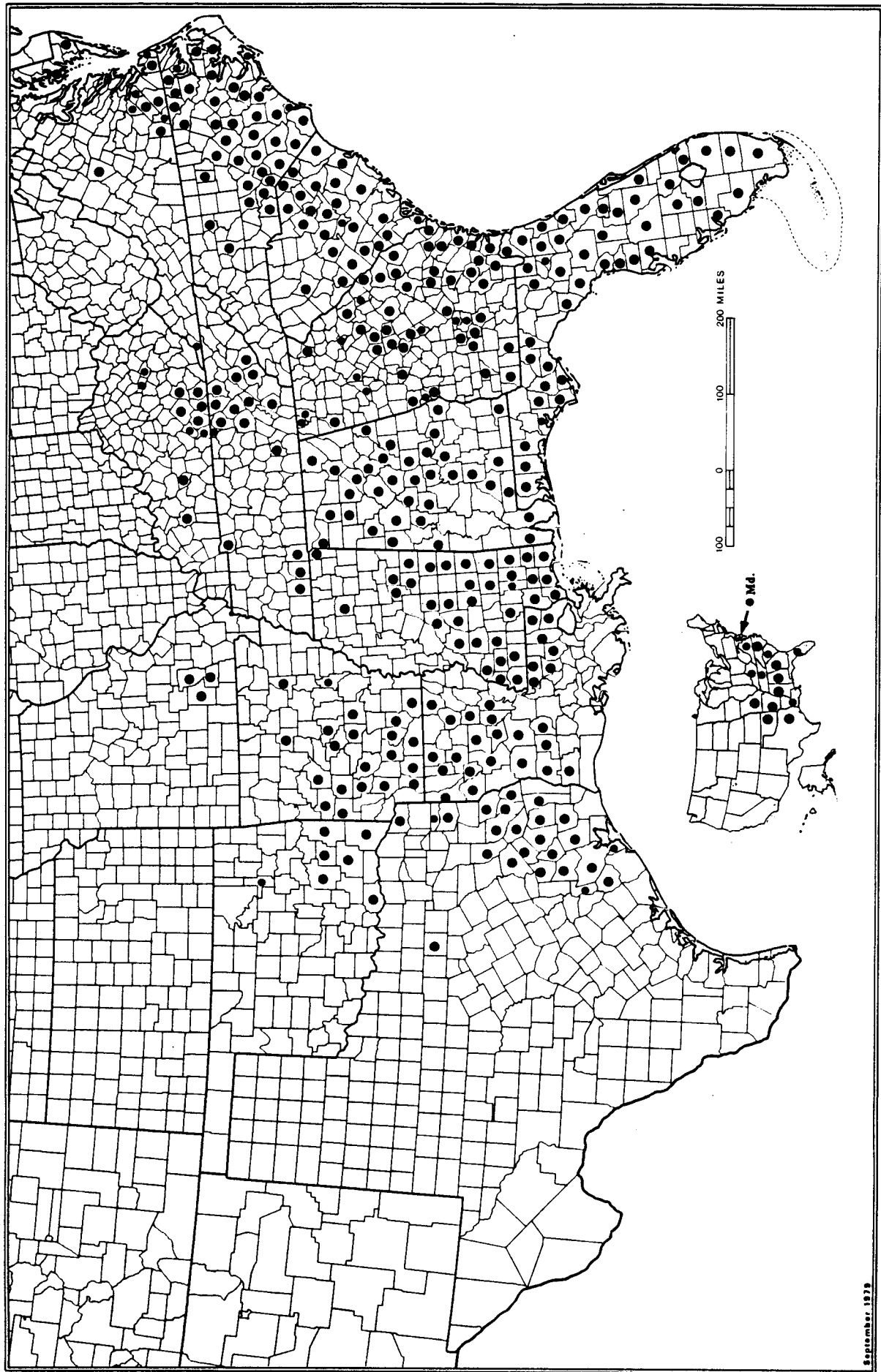
Robert G. Hooper is a wildlife biologist, Southeastern Forest Experiment Station, USDA Forest Service, 2730 Savannah Highway, Charleston, S.C. 29704. **Andrew F. Robinson, Jr.**, was an endangered species specialist, Southeastern Area, State and Private Forestry, USDA Forest Service, when this report was first published; he is now with the U.S. Fish and Wildlife Service, 75 Spring St., Atlanta, Ga. 30303. **Jerome A. Jackson** is professor of biological sciences, Mississippi State University, Mississippi State, Miss. 39762.

¹The suggestions are based upon those recommended by the National Recovery Team for the Red-cockaded Woodpecker.

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-

Historical distribution of red-cockaded woodpecker, by county and state.



ESTIMATING NUMBERS OF RED-COCKADED WOODPECKER COLONIES

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A long-term decline in red-cockaded woodpecker (*Picoides borealis*) populations has been attributed to loss of southern pine nesting habitat (Jackson 1971, U.S. Dep. Interior 1973, Lennartz and McClure 1979). Although the bird has been on the federal list of endangered species since 1970 (Federal Register, 13 Oct. 1970, Vol. 35 [199:16047]), a quantitative assessment of its range-wide population trends is unavailable. Local surveys (cf., Wood 1977, Baker et al. 1980) have employed methodologies which do not allow for objectively and quantitatively tracking population trends. Surveys reported to date (Wood 1977, Jackson 1978, Baker et al. 1980) have involved returning to historic sites of red-cockaded colonies to document the number of colonies. This approach is biased in that it allows for documenting colony losses but cannot identify colonies being established at new sites.

We have developed a simple and efficient technique for estimating breeding populations of red-cockaded woodpeckers. Use of the technique provides accurate estimates of populations on any forest property at much lower costs than alternate methods such as locating nests or counting birds. Acceptance of this technique as a standard procedure would allow summing of individual estimates into range-wide estimates from which population trends could eventually be derived.

BACKGROUND

Cavity trees of the red-cockaded woodpecker are relatively easy to find and categor-

ize as active or inactive, and the same trees are used by the birds for many years. To varying degrees, cavity trees occur in aggregations called colonies. A colony is merely the group of cavity trees used by a clan or a family of woodpeckers (Jackson and Thompson 1971). As each clan contains only 1 breeding pair, the number of active colonies represents the number of breeding pairs on an area. Although cavity trees are clumped into colony sites based on family relationships, variation in the number and dispersion of cavity trees within a colony makes it difficult to distinguish accurately between adjacent colonies. Colonies vary from 1 to 30 cavity trees (Jackson 1977), including trees with cavities being excavated, trees with completed active cavities, and trees with cavities that have been enlarged by other species and abandoned by red-cockaded woodpeckers. Cavity trees may range from 9 to 800 m apart (Hooper et al. 1980) within a colony. At the same time, the cavity trees of adjacent colonies may be only 200 m apart. Thus, the difficulty in delineating individual colonies is apparent. An alternative is to locate nests, as there is only 1 nest colony. Nest surveys, however, require biologists to climb all cavity trees that show red-cockaded woodpecker activity. This approach is time consuming and costly. The nesting season lasts little more than a month, and most colonies will have to be visited a number of times to assure finding nests. The manager under such a time constraint can only check on a relatively small proportion of the population each year.

Table 1. A comparison among evaluators using the circle technique to estimate the number of active red-cockaded woodpecker colonies.

Area	Size (ha)	Evaluators (n)	No. colonies				
			Known (N)	Estimates		Coefficient of variation	Accuracy (%)
				\bar{x}	Range		
Hobcaw Barony	3,016	17	29	31.0	29–33	3.5	94
Francis Marion National Forest Compartment							
1	754	18	5	4.0	—	0	80
2	894	18	2	1.0	—	0	50
3	541	18	2	2.0	—	0	100
4	835	18	4	4.0	—	0	100
5	619	18	4	3.0	—	0	75
6	1,015	18	2	2.0	—	0	100
7	451	18	9	7.7	7–10	9.0	85
8	675	18	6	7.7	7–8	1.0	88
9	722	18	6	6.6	6–7	6.4	93
10	719	18	1	1.1	1–2	6.6	98
1–10	7,225	18	41	39.1	37–43	3.5	95

Perhaps the major problem with nest surveys is that they confound population estimates and reproductive success. All woodpecker clans with a mated pair do not nest every year, and failure to find a nest could be interpreted as absence of a clan. Also, there can be nest failures resulting in the loss of entire clutches or broods, and unless colonies are visited and trees climbed on a regular and frequent basis, nests that fail may not be detected. In our study area, we monitored nesting success intensively for 5 years. In any given year, the number of clans with adult birds that attempted to nest ranged from 78 to 94%, and of those clans that nested, 65 to 95% fledged young. Consequently, unless nest surveys are coupled with monitoring to establish whether a colony site has a resident pair of adult birds, the failure to find nests could lead to gross underestimates in the number of breeding units.

DEVELOPMENT OF THE METHOD

We obtained information on the dispersion of cavity trees between and within 30 colonies on the Francis Marion National Forest (FMNF), South Carolina, by measuring the minimum, maximum, and mean dis-

tances between trees. This information, plus data collected 1976–1981, provided us with specific knowledge of 44 colony boundaries, the presence of breeding adults, and the location of nests. We selected test circles of 3 diameters: 282 m, 460 m, and 760 m. The 760 m diameter represented the extreme distance between 2 cavity trees measured in 30 colonies, 460 m represented the extreme distance between 2 cavity trees in 90% of these colonies, and 282 m represented the average of the longest distances between 2 cavity trees in all colonies. We used these circles to aggregate individual cavity trees which had already been plotted on a map of a 2,000-ha area on the FMNF. The rules for aggregating trees into colonies were that (1) each circle should encompass as many trees as possible, (2) circles should not overlap, and (3) a circle must contain at least 2 cavity trees with 1 being active. During the course of our investigations, we noted rare instances of a pair of woodpeckers using only a single, isolated cavity tree. However, the vast majority of the clans studied had more than 1 tree, so we excluded single trees.

The circle with the diameter equal to the average of the extreme distances between trees (282 m) in the 30 colonies on the FMNF grossly overestimated the number of colonies (63 estimated vs. 44 actual) on the test data set. When the longest distance found between 2 cavity trees (760 m) was used as the circle diameter, it greatly underestimated the number of colonies (30 estimated). The 460-m diameter circle, which represented the extreme distance between any 2 cavity trees in 90% of the colonies, resulted in an estimate of 43 colonies compared to the 44 actual number of colonies.

These results were encouraging and indicated high potential accuracy for estimating the number of red-

cockaded woodpecker colonies from correctly plotted tree survey data. However, 2 potential biases existed in these trials. First, we had detailed knowledge of the 2,000-ha area, which could have influenced the results; and second, 15 of the 30 colonies used to derive the circular scale were included in the 44 colonies used in the initial test. Therefore, to test the method, we obtained data from new areas and had the method applied by people unfamiliar with its development.

EVALUATION OF THE METHOD

Data were obtained from 2 sources. Locations of cavity trees and nests in 10 randomly selected compartments (administrative units) of the FMNF were provided by national forest wildlife technicians (Table 1). The data had been gathered to monitor the trend in the red-cockaded woodpecker population on the FMNF. The second data set was provided by Gene W. Wood of the Belle W. Baruch Forest Science Institute of Clemson University from Hobcaw Barony, 3 km east of Georgetown, South Carolina. These data were collected during several years of intensive study of that population.

Evaluators (of which 25 of the 35 were students of forestry and wildlife and completely unfamiliar with red-cockaded woodpeckers) were provided maps of the areas showing the location of active and inactive cavity trees, a template with a correctly scaled circle of 460 m diameter, and the following rules:

1. Only groups ≥ 2 trees, one of which was active, were to be circled.
2. The circle was to encompass or touch the maximum number of trees possible.
3. Single, isolated trees were to be ignored even though they were marked as active cavity trees.
4. Circles could touch but not overlap.

Circles were then counted, and the total was compared against the known population density derived from nest counts or the knowledge of the presence of a mated pair of marked birds. The estimates of the numbers of colonies on Hobcaw (3,016 ha) and on the 10 randomly selected compartments on FMNF (7,225 ha) were slightly less accurate than for our initial test of the method (94–95% vs. 98%). Accuracy for individual compartments ranged from a low of 50% to a high of 100%. Eight of the 10 compartments, however, had 80% or higher accuracy, and 50% of the compartments had 90% or better accuracy (Table 1). These results indicate that although a few compartments can present problems for all observers, over a range of compartment conditions, any evaluator can be expected to achieve 94–95% accuracy.

The problems encountered in the 2 compartments with low accuracy (50 and 75%) would have a negligible effect on population estimates of any sizeable area and can be corrected easily. Numbers of colonies in the compartments were low (2–4), and 1 colony straddled compartment boundaries. In both cases, the

active nest tree was the only tree within the compartment being evaluated. With such a low number of colonies in both compartments, missing a single colony produced apparently low accuracy. An actual survey, however, would generally involve larger areas and missing 1–2 colonies would have a minor effect on the total population estimate. Even this minor error, however, can be corrected. First, the surveyor could check to determine if the adjacent compartment has been surveyed. If so, then the adjacent compartment map should be examined for the presence of other cavity trees associated with the active tree located on the boundary. If other cavity trees are found, then the group should be counted as a colony. If the adjacent compartment had not been surveyed, then the surveyor could go to the field and survey a 460-m radius about the single tree. If other cavity trees are found nearby, then the group should be counted as a colony. By using either of these check procedures, accuracy in all compartments surveyed would be expected to exceed 80% and generally average 90% or higher.

MANAGEMENT IMPLICATIONS

The circular scale technique provides an accurate estimate of red-cockaded woodpecker colonies. The technique is simple, given that all cavity trees on the area are mapped accurately and categorized as active or inactive. This information is generally collected in management programs for this species.

The circular scale technique is also cost effective. It allows the manager to expand the utility of information he is already collecting and is less expensive than alternative census procedures. Attempting to find nests or count birds involves repeated visits to colony sites whereas the application of our technique involves a single visit to each site. Once at a colony site, forestry and biological technicians can quickly categorize the trees as active or inactive (cf., Hooper et al. 1980) and plot them on maps or aerial photos. The circling of plotted trees into colony aggregations takes only minutes.

Should one not desire or be unable to afford counting red-cockaded woodpecker colonies on a property, an estimate of number of colonies can be derived by sampling plots, compartments, or other administrative units. Because our method was developed and tested

on compartments or "plots" 450 ha and larger, we would not recommend smaller plots without additional field testing. It is imperative, of course, that sampling efforts employ appropriate statistical designs.

SUMMARY

An efficient and accurate technique for estimating the number of red-cockaded woodpecker colonies was developed on 3 areas of coastal South Carolina. The technique involves using a 460-m diameter circle to aggregate individual cavity trees which have been plotted on maps into colony groups. The method was tested against known colony numbers on 3 test areas, and accuracy of estimates ranged from 94 to 98%. Rules governing the use of the circle method include: (1) only groups of ≥ 2 trees, one of which is active, are to be circled, (2) the circle should encompass or touch the maximum number of trees possible, (3) single, isolated trees are to be ignored even though they are marked as active cavity trees, and (4) circles can touch but not overlap.

Acknowledgments.—We are grateful to D. L. Carson, W. R. Tyler, and G. W. Wood for supplying data to test the method and to Arthur Shearin and David Van Lear for the use of their forestry students in testing the method.

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Received 18 October 1982.

Accepted 25 April 1983.



INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 8

Species: American Alligator (Alligator mississippiensis)

Title: Alligator Night Counts

I. PURPOSE

The American alligator is an endangered species in Mississippi. As such, the species is given the refuge's full protection. Numbers and general location of alligator populations are needed by enforcement personnel. Also the gator is a very efficient predator and trend information (increasing or decreasing populations) could be of value in refuge management efforts.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

An inventory of the American alligator on Noxubee NWR shall be accomplished primarily through night counts, which do not give a true population estimate, but it does offer the best alternative. Night counts can be expanded to give refuge population estimates, but realistically, their only significant value lies in their worth as a trend indicator.

Night counts of alligators on Noxubee shall be conducted on predetermined routes on Bluff Lake and Loakfoma Lake (see attached map). These routes will be identified on a map and described so that repetition is possible. Routes will be run by outboard during the dark phase of the moon. Search lights should be a Q-beam powered by a 12-volt battery. Minimum candle power should be 100,000 watts. Search crews should consist of two men, one who operates the boat and the other who operates the light.

Alligators observed will be placed in three categories; young of the previous year (one foot or less), less than five feet and five feet or over. Any alligator not readily ascertainable as to its length will be placed in an unknown category (see attached reporting sheet). Lengths can be determined if a close enough approach to the gator can be achieved to observe the length in inches between the nostrils and the eyes. Inches from eye to nostril can then be converted to feet which will give the total length of the specimen observed.

Routes should be run from May-September, but the best time is mid-May until early July. The approximate time should be used every year, and the same observers are ideal, if possible. Calm, dark nights are ideal for observation. Observation attempts should commence

INVENTORY PLAN

immediately after it becomes dark.

Due to the extreme variability in observation from night to night, it is suggested that the same routes should be run twice each year with the higher estimate being sent to Dr. Robert Chabreck, Professor of Wildlife Management at Louisiana State University. The following information should be obtained: length of animals observed, number observed, temperature, time, wind, cloud cover, miles of route, location and observers (see data reporting sheet).

B. Data Analysis

Night count data should be provided to the Southeastern Alligator Survey coordinated by Dr. Robert Chabreck, Professor of Wildlife Management at Louisiana State University.

C. Data Filing

Data reporting sheets and summaries are to be filed in refuge files under WILDLIFE - Endangered Species-American Alligator.

III. SPECIAL CONSIDERATIONS

Route establishment should consider all types of lake habitat.

IV. MANPOWER AND COST

Personnel Costs	\$400
Equipment (aircraft)	
Other Supplies	<u>100</u>
TOTAL	\$500

Prepared By:

Jim Tiedale
Frank Bowen

Date:

10/11/85
10/15/85

Reviewed By:

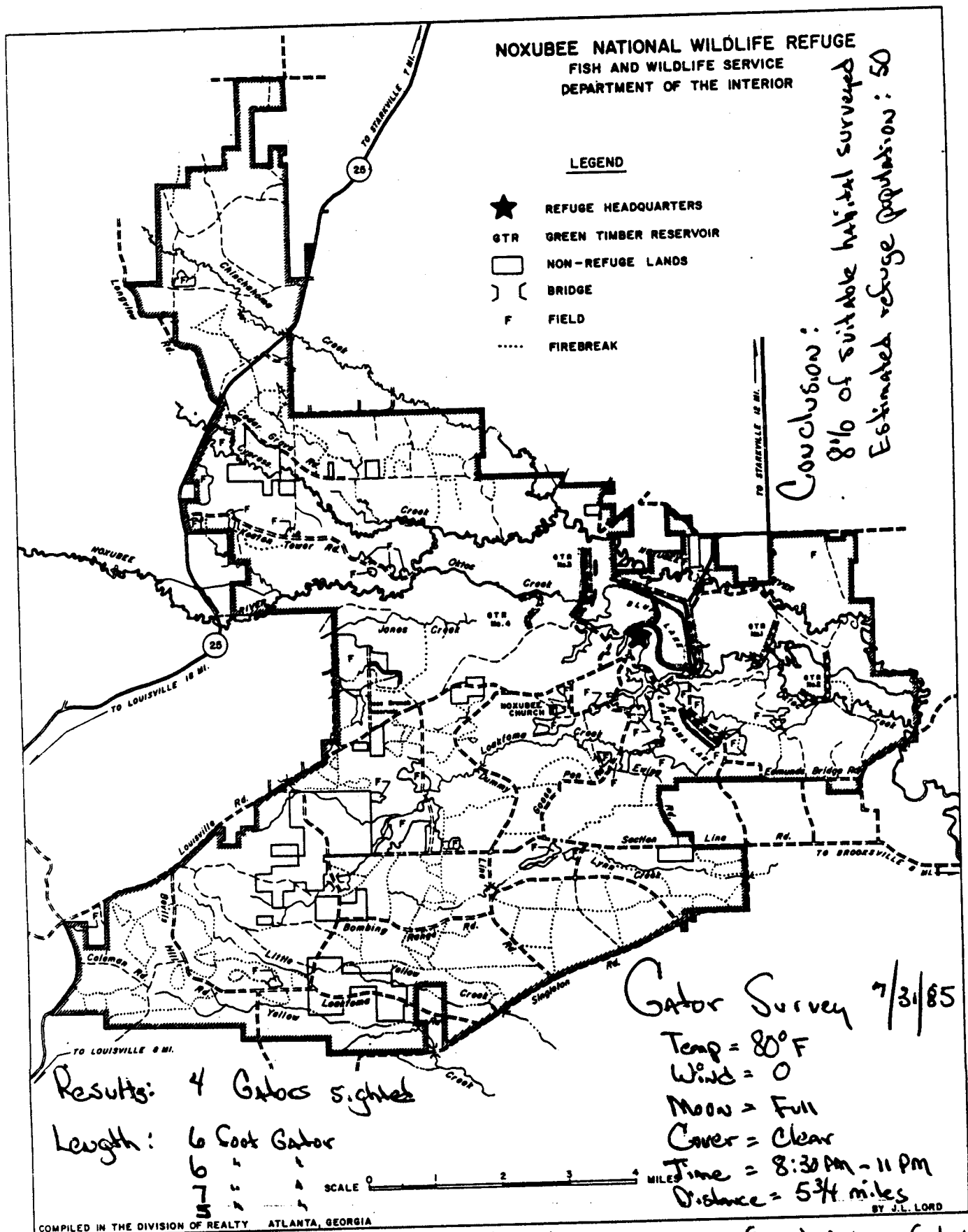
Date:

Refuge Approval:

Date:

Regional Approval:

Date:



Lookoma lake - water level to low to survey west (back) side of lake
GTR # 3 - water low and veg. high - difficult to see
* All 4 gator sighted in Bluff Lake

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 9

Species: Colonial Wading Bird Rookery Survey

Title: Rookery Survey

I. PURPOSE

Colonial birds are of high local significance. Rookeries are protected; therefore location of rookeries and amount and extent of nesting have definite management implications.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

An inventory or survey of all wading bird rookeries for Noxubee National Wildlife Refuge will be accomplished in two phases. The first phase will be the rookery location phase, and the second phase will consist of an actual survey of the total number of birds (breeding pairs) present in the rookery.

Location of rookeries will be accomplished by assembling all known records of rookeries and their location on Noxubee. In addition, a list of suspect areas will also be drawn up. From this point an actual location will be determined from ground and aerial surveys. Aerial surveys should begin in late March and can be concluded in June. These flights (2 or 3) should be over likely looking rookery habitat which is almost always associated with some type of wetland or habitual nesting locations. These flights may be in combination with other purposes such as aerial surveillance for southern pine beetle infestations. Once a rookery is located, then the approximate number of white and dark breeding pairs should be estimated.

All rookeries will be visited (visits should be limited and non-obtrusive) on the ground or water by observers to determine nesting progress. Once a peak of nesting activity is achieved, then a ground estimate of both species composition and number of breeding pairs present by species will be calculated. This estimate will be further checked aerially if the rookery is of significant size (several hundred pair of breeders). If the rookery consists of less than 150 breeding pairs, then all the calculations can be derived from the ground. Care should be taken to minimize disturbance to the site, especially when young birds are present in the nest. Visits should be early in the morning (before 9 a.m.) and late in the afternoon (after 5 p.m.) to preclude disturbance during the main stress periods of the day if the young are exposed to heat.

Ground checks should record date, observer, location, latitude, longitude, species and total populations. The specific form to be used (attached) is the one used in the 1983 joint U.S. Fish and Wildlife Colonial Bird Register. Surveys will be conducted on an annual basis. Information should be forwarded to the Colonial Bird Register on a yearly basis.

Personnel participating in this survey should consist of individuals of competent ornithological knowledge. They may or may not be Service employees.

Aerial surveillance should be initiated in late March and flown again in late April or early May. A slow flying aircraft with good visibility is ideal. All flights should be made on clear days with minimal wind disturbance. A total of 2-3 flights should provide all of the needed aerial information.

Ground surveillance can be accomplished by walking or wading into the immediate vicinity of the rookery. The observer should remain quiet and hidden for a period of 30 minutes to aid in identifying species present and the number of breeding pairs or active nests. By observing a small segment of the visible nests over a period of time until fledging, production can be estimated. Good binoculars or a spotting scope is a viable aid in obtaining accurate information. Active nests can usually be determined by bird activity and/or presence of excrement on the nest or tree.

B. Data Analysis

Data will be forwarded to the Colonial Bird Register and used for output reporting. Location of rookeries should not be public knowledge as unwarranted disturbance can be detrimental.

C. Data Filing

Survey information is to be filed in refuge files under WILDLIFE - Birds-Colonial Bird Register.

III. SPECIAL CONSIDERATIONS

Care should be taken to minimize nestling disturbance by eliminating noisy approaches by boat or ATV. If possible, the same observers should be used every year to preserve continuity. The described technique should identify all colonial species found on the refuge, such as great blue herons, little blue herons, cattle egrets, common egrets, snowy egrets, and to a lesser extent, green herons which are more solitary nesters.

INVENTORY PLAN

IV. MANPOWER AND COST

Personnel Costs	\$ 400
Equipment (aircraft)	700
Other supplies	<u>100</u>
TOTAL	\$1,200

Prepared By:

Jim Tisdale
Frank Bowen

Date:

10/11/8510/15/85

Reviewed By:

Date:

Refuge Approval:

Date:

Regional Approval:

Date:

Visit No. 1 to this colony for

current nesting season.

Mo. Day Yr. Started

Latitude Longitude

(ha)

Colony Name:

Subcolony

Colony Name: Bluff Lake Colony

Nearest Town: Brookville
County: Noble
State/Province/Territory: Mississippi

Country: U.S

DISTURBANCE

GENERAL COLONY

DISTURBANCE

Human Technology

HABITAT

Human Habitation

—

Human Recreation

Bald Cypress Marsh

Vehicular Use

Scientific Invest. ☐

OBSERVER: Last name, two initials.

HUBBARD, R R
OBSERVER'S ADDRESS:

人

LAND OWNER'S NAME AND ADDRESS: Rt 1 Box 142
Rocksville, Mo 64739

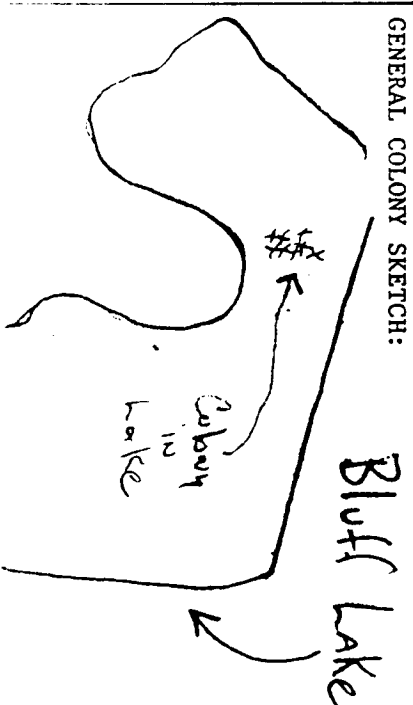
11/13 27/27
ESS:

Noxbee National Wildlife Refuge
Rt 1 Box 145 Brooksville MS,

REMARKS:

REMARKS: Bluff Lake did not have any public use in 1983.

GENERAL COLONY SKETCH:



Colony Size
(ha)

current nesting season.

6

Subcolony		
-----------	--	--

Census
Technique

GENERAL COLONY

HABITAT

11

आर्य समाज

—

Initials.

100

142

3

ESS:

55

30

25

 $\frac{1}{2}$

•

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 10

Species: Shorebirds, Marsh Birds, Wading Birds

Title: Shorebird, Marsh and Wading Bird Indices

I. PURPOSE

The populations of this group of wetlands birds are not significant at Noxubee, and the group is not of high local significance. However, information is needed on number of species and general use patterns.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

Staff will make incidental observations of these species throughout the year and record information at the refuge headquarters. During the months of April and May and late August through September, a more concentrated effort will be made to visit the key waterbird sites shown on attached map and record species and numbers seen in these areas. At a minimum, the key sites shown should be visited twice during April, May, August and September to partially make general observations of the species groups and data recorded.

B. Data Analysis

The final data tallies (from totals) should be included in the annual narrative report and used on output reports.

C. Data Filing

Observation records will be filed in the refuge files under WILDLIFE - Birds-Wading and Shore Birds.

III. SPECIAL CONSIDERATIONS

Some consideration should be given to sampling a few beaver ponds to get ideas on marsh/wading bird use of these wetlands during the key periods (April-May, August-September).

IV. MANPOWER AND COST

Personnel	\$200
Equipment (aircraft)	
Other Supplies	—
TOTAL	\$200

Prepared By: Jim Tisdale Date: 10/11/85
Frank Bowen 10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 11

Species: Raptors

Title: Raptor Inventory

I. PURPOSE

At present, raptors at Noxubee are not ranked as high in significance as several other species; therefore a formal, intense survey technique will not be initiated. The refuge will continue to work with Wildlife Assistance regarding an ongoing study that involves a road route survey. (Attached are forms and directions.) Refuge staff will continue to record incidental osprey sightings with special emphasis on the late summer and fall. If at a later date a formal inventory technique is favored, vocalization routes should be tested.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

Incidental observations will continue by refuge staff. Some special effort should be made to assure staff observations during osprey visitations. If a Class B inventory is desired in the future, a vocalization route survey should be explored for raptors.

B. Data Analysis

Data reported to Wildlife Assistance.

C. Data Filing

Copies of data sheets will be filed in refuge files under WILDLIFE: Birds - Raptors.

III. SPECIAL CONSIDERATIONS

Unusual sightings, numbers, etc. are noted by staff in the course of other duties.

IV. MANPOWER AND COST

Personnel Costs	\$200
Equipment (aircraft)	
Other Supplies	—
TOTAL	\$200

INVENTORY PLAN

Prepared By: Jim Tisdale Date: 10/11/85
Donald Bawer 10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

folks
happy holidays

WINTER RAPTOR SURVEY
U.S. Fish and Wildlife Service
P.O. Drawer
Mississippi State, Mississippi 39762

SURVEY YEAR ~~1984~~ 1985
ROUTE NUMBER
COUNTY Noxubee, Winston, Oktibbeha
STATE Mississippi
LOCATION OF ROUTE

OBSERVER'S NAME
ROYCE HUBER
TOM ALEXANDER

MAILING ADDRESS
NOXUBEE NWR
RT 1 Box 142
BROOKSVILLE MS 39739

AT START:

TIME
WIND DIRECTION
WIND VELOCITY
TEMPERATURE
% SKY CLOUDY
ODOMETER READING

1:30 PM
NW
0-3
50 °F
0
39028

AT FINISH:

TIME
WIND DIRECTION
WIND VELOCITY
TEMPERATURE
% SKY CLOUDY
ODOMETER READING

4:30 PM
NW
0-5
50 °F
0
39082

DATE OF SURVEY

11/7/85

WAS THIS ROUTE RUN
BY YOU LAST YEAR?

YES NO

LOCAL OFFICIAL
SUNSET TIME

p.m.

mile cre- nts	Red-tailed Hawk	Sparrow Hawk (Kestrel)	Red Should- ered Hawk	Marsh Hawk	Other Hawk Species	Uniden- tified Hawks	Turkey Vulture	Black Vulture	Great SHRIKE
1-10	III (3)		(2)		Bald (1) Eagle (Black Hawk)				
1-20			(1)	(1)					
1-30								30 44	
1-40									
1-50	All birds were observed in mixed forest								
1-60	except marsh hawk and Bald Eagle which were								
1-70	observed over open water.								
1-80									
1-90									
1-100									
TOTAL	3		3	1	1			44	

Bald
Eagle

WINTER RAPTOR SURVEY INSTRUCTIONS:

MISSISSIPPI SANDHILL CRANE N. W. P.
P. O. BOX 699
GAUTIER, MISSISSIPPI 39553

Enclosed are the forms to be used for the fifth annual Mississippi Winter Raptor Survey to be conducted December 15, 1984 through January 6, 1985.

Below is a summary of the preferred method for running a route. Enclosed is a copy of your previous route. Please run it unless requested to do otherwise.

1. If you wish to record habitat for each bird, the habitat types have been numbered. Also, abbreviations for age classes and sex are available. If you're good at it, you may be able to differentiate age class on all species. Sex differences occur in Kestrels, Merlins, and Marsh Hawks. If you don't feel comfortable with either, but you are going to record habitat don't list U12, U10, etc., just list 12, 10, 9,... Thus, your data sheet would read:

Red-tailed Hawk	Marsh Hawk
A9, A6, All, Ill	M14, F10, U9

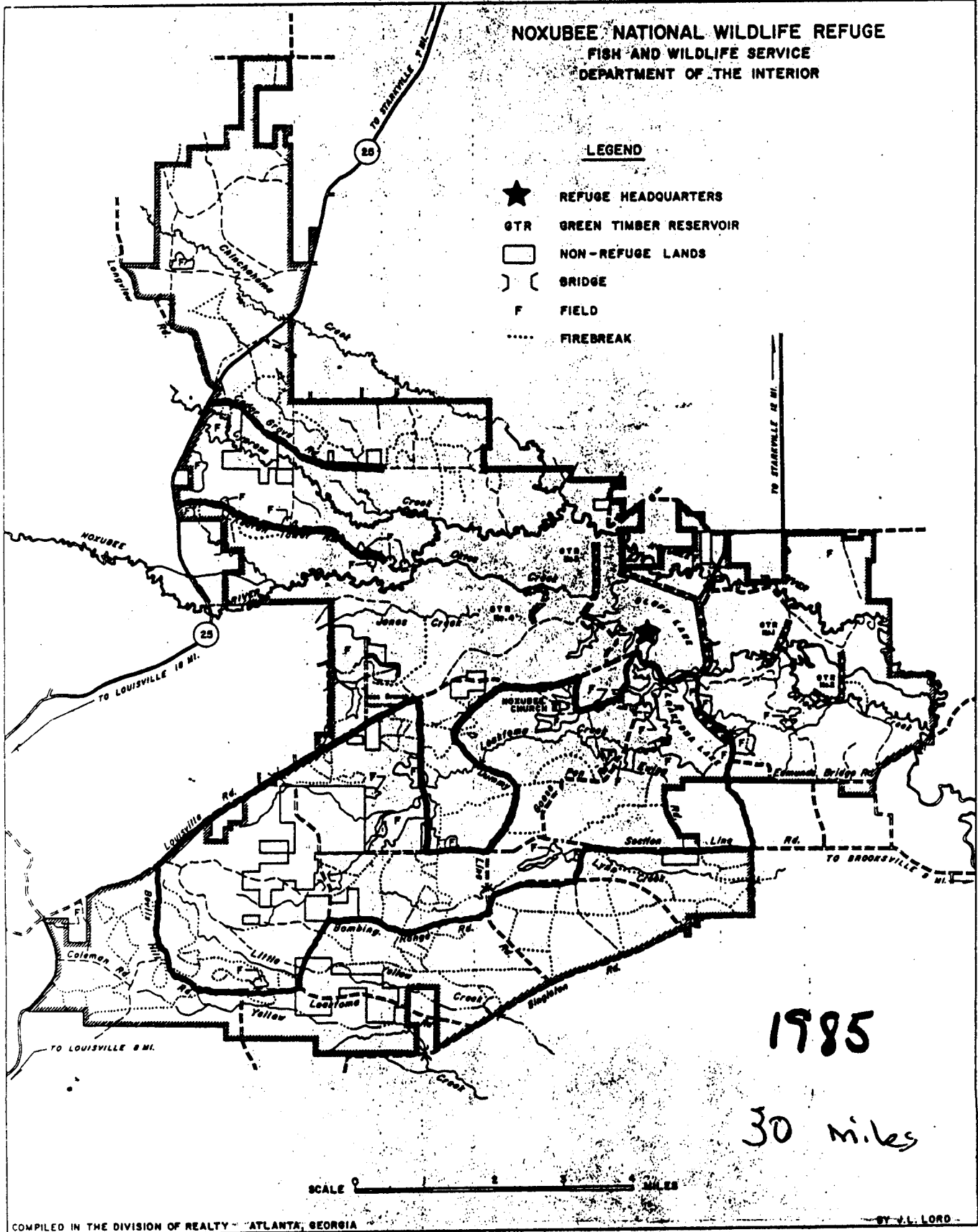
That would be a total of four Red-tails (3 adults, 1 immature) and three Marsh Hawks (1 male, 1 female, 1 unknown). With vultures, if you see a lot of them, record the number you see/habitat (i.e. 20/17 - saw 20 on man-made structure).

2. Car speed should be 20-40 mph. Thus, county roads would be preferable. If you cannot drive at this speed due to traffic conditions, record your mph on the survey sheet.
3. Begin survey at 1:00 p.m. on a clear sunny day. The activity level of the hawks is better in the afternoon. Obviously, however, if you are surveying on your way to or from work, this may not be convenient.
4. Count all hawks that can be seen with the naked eye using binoculars for verification. The trend data will be the most significant for Red-tailed Hawks and American Kestrels. But if you see any of the other birds mentioned, please make note of them (use Comments space on reverse side).
5. Start and finish information - be sure to record the date and the following data when you begin and finish the route.
 - a. Time
 - b. Temperature - if you don't have a thermometer, use a time/temperature teller as soon as you can for your area, or listen to a local radio station.
 - c. Per cent cloud cover
 - d. Wind direction
 - e. Wind speed - use Beaufort Wind Scale number (see reverse side of form).
 - f. Odometer reading - beginning and ending mileage, not speed.
6. Break up your observations into ten mile increments. We need to standardize the form. (i.e. if you go 52 miles, don't record the last two. If you end at 58, go an extra two miles to reach 60.)
7. Do not fill in the route number. It will be assigned later.
8. Mail your survey form/map to my office as soon as possible.

NOXUBEE NATIONAL WILDLIFE REFUGE
FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

LEGEND

- ★ REFUGE HEADQUARTERS
- QTR GREEN TIMBER RESERVOIR
- NON-REFUGE LANDS
-) (BRIDGE
- F FIELD
- FIREBREAK



Refuge: Noxubee National Wildlife Refuge

Procedure: Number 12

Species: Southern Bald Eagle (Haliaeetus leucocephalus)

Title: Bald Eagle Mid-winter Survey

I. PURPOSE

The southern bald eagle is an endangered species, and other geographic populations are classified as endangered due to similarity of appearance. The purpose of this survey is to determine population trends of eagles and the geographic distribution of the birds at the time of the survey.

Management activities related to endangered species are a high priority on all national wildlife refuges.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

The National Wildlife Federation (NWF) coordinates this national survey which is conducted in January of each year. Procedures for this survey are determined by the NWF and transmitted to cooperators which includes all NWR's. The refuge will follow the procedures established by the NWF. Attached is an example of information received from the NWR for the 1984 survey which includes instructions and a field data recording form. Note that a map with the survey route clearly outlined in detail should be submitted with the field data to the NWF. Refuges will keep a copy of all data submitted to the NWR.

B. Data Analysis

Data will be used in refuge reporting requirements.

C. Data Filing

Copies of the survey will be filed in refuge files under WILDLIFE: Endangered Species - Eagles.

III. SPECIAL CONSIDERATIONS

Each year project leaders will receive instructions, data forms and date survey is to be conducted from the NWF. Procedures outlined in these instructions should be followed.

IV. MANPOWER AND COST

Personnel Costs	\$100
Equipment (aircraft)	
Other Supplies	_____
TOTAL	\$100

Prepared By: Jim Tisdale Date: 10/11/85
Arnie Bowen 10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

A State MS
C County Norwalk (only one per form)
D Name of Recorder: Alexander
(601) 523-5548
Address and Phone: RTI Box 144 Brookhaven, MS

Affiliation: USFWS
No. of observers: 1

OFFICE USE ONLY
BCN# 118-111-111

OFFICE USE ONLY
TRD# 111

FORMS MUST BE SUBMITTED
TO THE REGIONAL COORDINATOR
NO LATER THAN 1/31/84

BCN#:		Location ^a		Lat/Long ^b		Count ^c		Method ^d		Date ^e		Time ^f		Adult Imm.		Unk.		Total Adult Imm.		Total Other			
						Type								B.E.		B.E.		G.E.		G.E. Eagles			
1		BLUFF LAKE - NORWEE NWR		331-0884		X		FP		1/6		16:00		2		2							
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							
13																							
		Please complete "Comments" section on back of form												Page Totals		2		2					

- a) List each location surveyed using abbreviations on reverse side of this form (e.g. MINGO NWR, SKAGIT R, MODOC NF, CHENEY RES). Each line of data should represent a single 10 minute lat./long. block (see superscript b) (e.g., for a survey along 55 mi. of a river, report data separately for each 10 minute block surveyed along the river. Discrete locations surveyed within the same 10 minute block should also be reported separately. (e.g., a stretch of river occurring in the same block as an upland night roost). REPORT ALL LOCATIONS AND 10 MINUTE BLOCKS SURVEYED, INCLUDING THOSE IN WHICH NO EAGLES WERE SIGHTED. IMPORTANT: Attach a map (portion of State highway map or map with more appropriate scale) with the survey route clearly outlined in detail. IF SUCH A MAP DOES NOT ACCOMPANY YOUR SURVEY FORM, WE WILL BE UNABLE TO USE YOUR DATA.
- b) Record the first three digits of latitude and the first four digits of longitude for the SE coordinates of the 10 minute block of latitude and longitude in which the survey occurred. Example: a feeding area located at approx. 48° 23' latitude, 122° 45' longitude is within the 10 minute block delineated by 48° 20' to 48° 30' latitude and 122° 40' to 122° 50' longitude. The coordinates of the SE corner of this block are 48° 20' and 122° 40' and are coded "482-1224" (note: for longitudes less than 100° -- 77° 33' longitude would be coded "0773").
- c) Indicate whether the survey at this location was a count of a night roost by the letter "R".
For all others, indicate with an "X".
- d) Indicate survey method: Fixed wing (FW), helicopter (H), boat (B), count route (CR), fixed point (FP).
- e) Month/day/year
- f) Use military time (e.g., 0900)
- g) Eagles not identifiable as balds or goldens.

RETURN TO:
Fred Bagley
U.S. Fish & Wildlife Service
Jackson Mall Office Suite 316
300 Woodrow Wilson Avenue
Jackson, Mississippi 39213

COMMENTS

Visibility: GOOD

Precipitation? NO

Ice conditions at various
locations surveyed: NONE

Prey availability and types: Excellent - Waterfowl

Local movements of eagles Eagles have been seen regularly on Doyle Arm, West end of
during survey period Bluff Lake and GTR 2 and 3.
(if known):

Wing or band tag markers seen: NA
(describe in detail)

Other:

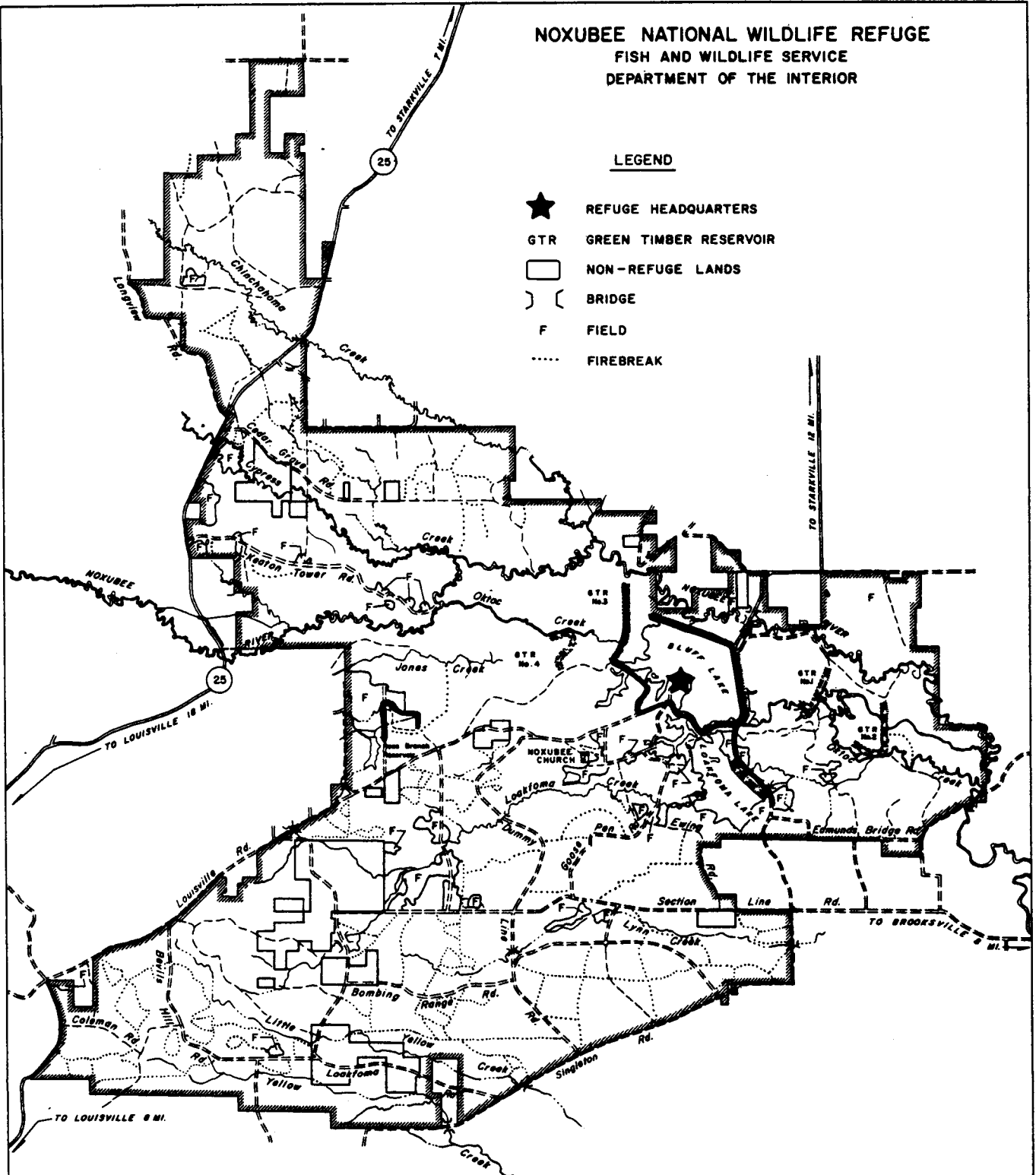
LOCATION ABBREVIATIONS

- | | | | |
|------------------------------|------------------------------|--------------------------------|--------------------------------|
| B - Bay | I - Island | NHS - National Historic Site | RES - Reservoir |
| CK - Creek | L - Lake | NM - National Monument | S - South |
| CY - Canyon | MT - Mountain | NRA - National Recreation Area | SF - State Forest |
| D - Dam | MTS - Mountains | NS - National Seashore | SP - State Park |
| E - East | N - North | NWR - National Wildlife Refuge | VA - Valley |
| FH - Fish Hatchery | NF - National Forest | PT - Point | W - West |
| HBR - Harbor | NFH - National Fish Hatchery | R - River | WA - Wilderness Area |
| IND RES - Indian Reservation | NG - National Grasslands | RA - Recreation Area | WMA - Wildlife Management Area |

NOXUBEE NATIONAL WILDLIFE REFUGE
FISH AND WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

LEGEND

- ★ REFUGE HEADQUARTERS
- GTR GREEN TIMBER RESERVOIR
- NON-REFUGE LANDS
-) (BRIDGE
- F FIELD
- FIREBREAK



SCALE 0 1 2 3 4 MILES

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 13

Species: . Passerine Birds

Title: Christmas Bird Count

I. PURPOSE

Passerine birds are of considerable interest to the Fish and Wildlife Service, particularly from the standpoint of determining what bird species occur on refuges as well as within certain other geographic areas. It is also important to know what bird species do not occur on a particular refuge if that refuge is within the range of the species. The information gained from this survey helps to keep refuge bird lists current, and it also provides useful management implications.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

The Christmas Bird Count is coordinated by the Audubon Society and is conducted annually and generally during last two weeks of December and the first week of January. All refuges should participate in this survey and follow the procedures established by the Audubon Society. A synopsis of counts from 1970-84 on Noxubee is attached.

B. Data Analysis

The Christmas Bird Count represents the only census of passerine birds and is the primary source of information to up date the refuge bird list.

C. Data Filing

A copy of the Christmas Bird Count is filed in the refuge files under WILDLIFE: Birds-General.

III. SPECIAL CONSIDERATIONS

IV. MANPOWER AND COSTS

Personnel Costs	\$100
Equipment (aircraft)	
Other Supplies	_____
TOTAL	\$100

INVENTORY PLAN

66

Prepared By:

Jim Tidole
Frank Bowen

Date:

10/11/85
10/15/85

Reviewed By:

Date:

Refuge Approval:

Date:

Regional Approval:

Date:

Noxubee National Wildlife Refuge, Miss. Christmas Bird Counts

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984		
Species	81	90	83	85	83	83	91	94	91	80	84	85	91	102	101		
Individuals	1207	2695	11253	515035	52244	25341	13435	35307	26933	8744	12792	8577	15448	38188	12045		
Temp. (°F)	44-55	45-49	37-43	47-60	35-50	30-42	40-67	47-65	31-52	47-62	22-38	15-41	30-52	26-56	55-74		
Wind (mph)	SW 4	SW 2-3	SW 1-2	SW 0-10	Var. 7	Var. 0-5	Var. 0-2	Var. 0-5	Var. 0-4	Var. 0-3	Var. 0-4	Var. 0-4	Var. 4-12	Var. 0-4	Var. 10-20		
Observers	19	23	11	13	12	15	13	20	22	20	21	25	27	34	22		
Party Hours	20	27	39	45	35	34.5	41.5	46.7	57	35	48	51	64	68	69		
Party Miles	754	156	236	375	305	286	130.5	218	209	149	104	168	181	189	499		
Compiler	Joyce Jackson	JJ	JJ	JJ	JJ	JJ	JJ	JJ	JJ	JJ	William Cross	WC	WC	WC	William Turner		
Common Loon								2				5	1	1			
Horned Grebe		CP			2	2	3										
Pied-billed Grebe	5	CP	1	1	4	15	81	6	17	5	5	32	19	18	6		
D.C. Cormorant	11	30	18	23	4	6	1	5					63	89	95		
Anhinga		CP											26	6			
Gr. Blue Heron	27	16	14	20	24	6	20	20	48	9	14	24	10	22	125		
Little Blue Heron								5		1							
Cattle Egret													3	3			
Great Egret	7	24	1	4	3	CP	4		5	1		4	1	4	1		
Bl. Cr. Night Heron								1									
Am. Bittern	3																
White Ibis						CP							5				
Whistling Swan							CP		1								
Canada Goose	75	33	125	86	158	58	225		375	400	350	600	187	66	304		
Wh.-fr. Goose		12					CP										
Snow Goose	6	13		60	2		1	3		4	1		CP	CP			
"Blue" Goose	2	CP		40	8		13	1						8			
Mallard	6653	872	211	1360	2912	707	1402	4027	4044	2985	742	1030	179	470	161		
Am. Black Duck	7	1				CP	4	65	202		9	21	CP	3	2		
Gadwall	300	4	20	413	CP	55	206	127	1300	12	75	362	40	85	130		
Pintail	812	200	18	1246	241	103	1177	330	2008	242	29	11	7	58	16		
Gr.-Wing Teal	404	78	354	357	27		702	1214	402	30	400	64	4	99	29		
Bl.-Wing Teal	50												CP	CP			
Am. Wigeon	1000	70	127	577	903	50	1666	547	2550	633	365	130	35	227	52		
N. Shoveler	58	32	71	610	4	6	62	87	67	16	129	11	46	113	21		
Wood Duck	16	3000	98	256	97	33	18	24	21	46	160	1070	19	23	299		
Redhead					4												
Ring-n. Duck	60	70	384	1053	401	411	813	511	2600	12	244	472	600	352	253		
Canvasback	3	3	20			1	36	1	12		CP	CP		CP			
Lesser Scaup				1	28	22	45	50	CP			CP		10			
L. Goldeneye												CP			1		
Bufflehead	21	2	10	7	13	4	54	3	106		11	26	20	21	4		
Old Squaw	7										10	3	21	47	22		
Ruddy Duck	3	44	32	61	150	301	233	120	300								
Hooded Merg.	41					117	28	253	200	6	80	444	37	57	6		

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Turkey Vulture	5	7	16	81	16	74	21	38	174	16	51	25	184	449	289
Black Vulture	15	14	28	53	65	52	38	102	109	70	184	46	88	366	72
Sharp-sh. Hawk			1						1			2	3	3	2
Cooper's Hawk			2	1											1
Red-tailed Hawk	11	7	16	13	8	9	7	14	12	18	21	30	22	23	17
Red-sh. Hawk	2	1	2	1	1	1	5	13	17	10	14	23	9	13	14
Harlan's Hawk									cp						
Broad-winged Hawk		1													
Golden Eagle							1	1	1						
Bald Eagle	3	2	4			1	1	1	2	3	3	5	4	1	4
Marsh Hawk	6	4	21	7	2	2	2	4	9	11	12	10	10	7	
Osprey		1													
N. Harrier															4
Am. Kestrel	4	7	4	10	2	8	6	7	11	3	6	12	18	16	8
C. Bobwhite	25	40	25	12	50	43	15	77	145	81	66	40	52	70	35
Wild Turkey		1			1	cp		4		18	13	2	11	6	4
King Rail	cp														
Am. Coot	116	103	117	283	1009	35	66	274	179	70	700	456	165	458	188
Killdeer	22	8	26	27	28	36	53	218	24	10	39	36	22	93	59
Am. Woodcock	cp	3	1		1			1	1			cp	cp	1	cp
Com. Snipe	3			5		5	9	49	8	11	9	28	2	5	1
Least Sandpiper							2		1						
Snipe/Western Spr.														2	
Dunlin									1						
Ring-billed Gull													1	3	11
Bonaparte's Gull							1			1		cp			10
Rock Dove				42	2	1	1			2		6	1	30	18
M. Dove	153	30	15	78	34	18	4	46	87	20	12	30	32	75	32
Barn Owl		cp	cp		cp				1			1			
P. Screech Owl		1	1	1	cp	cp		1						1	3
Gr. Horned Owl	6	1	2	1	1	1	1	2	cp	2	cp	5		2	1
Barred Owl	12	4	7	4	6	10	6	10	20	5	8	13	6	16	19
Belted Kingfisher	7	3	3	9	2	7	5	10	10	8	3	8	7	9	7
Yel.sh. Flicker	25	31	51	64	24	40	31	29	41	54	94	26	40	65	37
Pileolated Wdpr.	6	3	12	10	8	9	10	12	19	8	13	12	14	15	19
Red-bellied Wdpr.	15	20	31	29	30	32	39	34	46	35	30	34	49	57	45
Red-headed Wdpr.	4	13	36	22	21	19	53	44	71	40	19	27	26	68	57
Y.b. Sapsucker	4	11	3	9	10	21	13	26	15	5	6	8	11	14	7
Hairy Wdpr.	2	2				4	7	3	1	3	1	2	2	4	5
Downy Wdpr.	14	14	21	40	18	7	13	14	19	24	15	18	26	20	29
Red-c. Wdpr.	7	1	21	17	19	10	19	18	16	23	7	cp	11	4	5

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
E. Phoebe	19	12	7	7	17	10	7	22	7	4	30	16	26	27	14
Blue Jay	75	69	134	211	185	116	45	113	162	223	177	64	110	345	257
C. Crow	62	41	104	132	143	103	105	107	107	99	57	107	250	238	383
Car. Chickadee	34	55	70	61	49	32	49	122	100	95	43	72	98	112	210
Tuf. Titmouse	7	19	13	19	25	10	17	31	33	15	17	20	38	55	58
Wh-br. Nuthatch				5		2	2	1		1	2	1	5	1	2
Red-br. Nuthatch		2	2			cp		4	2			1			
Braun-h. Nuthatch	15	9	15	9	14	4	18	20	15	16	1	8	13	27	20
Brown Creeper		4			2	cp	4	10	6	1	3	cp	6	18	10
House Wren		2		1		1		cp							
Winter Wren		cp	2	3	4	cp	7	4	3		3	3	2	11	12
Carolina Wren	17	35	46	36	19	12	39	36	27	24	17	20	43	65	69
Marsh Wren									cp						2
Sedge Wren									3					1	1
N. Mockingbird	16	56	44	109	30	56	17	21	34	15	22	22	30	34	24
Gray Catbird			7	1									1		2
Br. Thrasher	7	22	20	46	32	18	27	46	32	33	28	19	17	57	39
Am. Robin	11	284	69	158	18	122	40	168	21	96	105	81	133	20	212
Hermit Thrush	4	7	7	8	7	3	14	13	21	7	14	2	10	16	16
E. Bluebird	20	19	20	20	8	10	12	16	9	22	12	16	59	67	85
Golden-cr. Kinglet	5	36	50	21	32	10	30	11	34	21	24	9	15	119	145
Ruby-cr. Kinglet	11	26	12	16	24	18	28	38	56	20	19	17	34	145	59
Water Pipit			1		1	1	1	2	cp			cp		16	30
Cedar Waxwing		235	220	191	11	14	cp	144	28	90	157	cp	65	149	235
Loggerhead Shrike	21	21	25	46	29	35	12	21	25	30	13	19	29	34	32
European Starling	50	624	1558	151201	104809	1681	422	4212	198	70	82	30	552	291	193
Wh-eyed Vireo				1	1	cp	3		1					2	2
Solitary Vireo							1	1						1	1
Ovenbird															1
Or-cr. Warbler						cp								1	
Vel-cr. Warbler	cp	8		15	3	36	22	24	33	5	12	78	103	86	98
Pine Warbler	3	4	4	17	31	7	13	13	21	3	13	9	38	106	47
Palm Warbler			2			1									
C. Yellowthroat	1	1	3	1	1		cp		cp	1	1	1	2	1	1
House Sparrow	18	50	41		83	46	cp	1		29	12	57	76	200	68
E. Meadowlark	59	357	174	291	79	224	82	73	304	101	145	162	73	174	121
Red-w. Blackbird	405	932	1337	26971	103435	9026	625	8603	3036	342	620	966	739	1337	2715
Rusty Blackbird	60	53	35	20	3	46	23	101	10		45	45	24	16	1
Brewer's Blackbird	130		100	134	405	42	55		128		1850	575	50	cp	

[illegible]

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 14

Species: Fish

Title: Sampling of the Refuge Fishery

I. PURPOSE

Refuge waters need to be sampled annually to determine the condition and balance of fish populations. Findings relate directly to management for public fishing.

II. PROCEDURE AND DATA ANALYSIS

A. Procedure

Noxubee is sampled each year by a Service fishery biologist. At present, John Forester - Natchitoches, Louisiana, conducts the survey and gives us recommendations as to management needs.

A description of survey techniques and an example of report which recommendations are attached. The attached map shows waters sampled.

B. Data Analysis

The fishery biologist taking samples will analyze data and make recommendations on management actions needed.

C. Data Filing

Survey results and recommendations are filed in refuge files under WILDLIFE: Fish.

III. SPECIAL CONSIDERATIONS

When possible, arrangements should be made to sample the species composition of select refuge drainages, with special emphasis on major streams/rivers. This will involve University personnel knowledgeable about identification of darters, mullosks, etc.

INVENTORY PLAN

IV. MANPOWER AND COST

Two mandays per year will be required to assist fishery biologist in taking samples.

Personnel Costs	\$ 400
Equipment (aircraft)	
Other Supplies	<u>100</u>
TOTAL	\$ 500

Prepared By: Jim Tisdale Date: 10/11/85
Frank Bowen 10/15/85

Reviewed By: _____ Date: _____

Refuge Approval: _____ Date: _____

Regional Approval: _____ Date: _____

UNITED STATES GOVERNMENT

Memorandum

TO : John S. Forester, Fishery Mgmt. Biologist
Natchitoches NFH, LA

DATE: 6/3/85

FROM : Royce Huber, Asst. Refuge Manager
Noxubee NWR, MS

SUBJECT: Sampling of the Fishery at Noxubee NWR

Sampling gear used at Noxubee consists of rotenone, a fish toxicant, the electroshocking boat and gill nets. Fishermen interviews are also conducted. When sampling a waterbody a very important aspect of the fishery is whether the sportfish, particularly bass, have had a successful spawn. To check for this I apply rotenone to several small areas (20x20 feet) of the waterbody. If the bass and bluegill have spawned this is one indication that the population is in good shape. Another indicator is the length/frequency of bluegill, i.e. what is the relative abundance of your three groups (the newly hatched and young (0-2"), the intermediates (3-5"), and harvestables (6-8")). If you have a stunted population, i.e. many intermediates when compared to the 0-2's and the 6-8's, that's a sign of a low predator population.

A well fertilized farm pond will produce 400 pounds of bluegill and 40 pounds of bass per acre per year whereas one low in fertility will produce only a fraction of that. In central and northwestern Louisiana impoundments, the range is 10-15 pounds of harvestable size bass per acre. Bluff had 19 pounds in the 1.5 acres sampled with rotenone.

Gill nets are used to check the condition and length frequency distribution of sportfish and to check for the presence of other species. ~~It is~~ ^{they} ~~is~~ also used to determine growth rates of catfish following stocking. Mesh size will naturally determine sizes of fishes caught. I use a gill net of 125 feet which contains five panels each of a specific mesh size. The sizes range from .75 inch bar mesh to 1.75 inch. It is a standard experimental gill net devised to capture several sizes of fish.

The electroshocking boat is used for capture of medium to larger sized fish (small fish are not as susceptible to electric shock). Presence of undesirable fish such as gar, carp, large gizzard shad (in large numbers) can be quickly determined. The effectiveness of electroshocking is determined by the dissolved minerals in the water. The soft waters at Noxubee have hampered successful electrofishing. Some modifications have been made to the electrodes since my last visit in an effort to increase efficiency.

A method of determining the condition of a sportfish population (bass, bluegill, etc.) has been developed by R.O. Anderson with the USFWS at the Missouri Cooperative Fishery Research Unit. To properly use the method, called Proportional Stock Density (PSD), however, requires the capture of 100 largemouth bass by electroshocker per waterbody. The PSD for Loakfoma using a very limited number of electrofished bass (12) was 33 using 11.5 inches and above as a quality fish which falls within the desirable range. If the PSD value is not satisfactory Anderson suggests



length limits to bring the population back to a more desirable distribution of sizes.

Fishermen interviews provide general information as to species sought, success rate, size of fish and overall attitude of the fishermen.

More information could be gathered on the fishery of each waterbody by more extensive sampling. This could include larger rotenone samples with block nets and 2nd and 3rd day retrievals and using values developed at Auburn (F/C, AT, etc.) to determine population structure (see attached Swingle paper). Or the PSD method could be used (see attached Anderson paper). Creel census (copy attached) also provides useful information. However, using the above mentioned sampling gear, I can generally tell in the time allotted for each waterbody if the conditions for "balance" of a good fish population as described by Redmond (attached) are present.

Restricted creel limits as imposed at Noxubee are generally not recommended. However, with the excessive rainfall and outflow of water experienced at both impoundments in 1983 and the reported and expected emigration of sizeable numbers of bass from these waters prior to opening, a 5 fish limit was imposed in an effort to spread the remaining fish among more anglers. These restrictions will probably be unnecessary following the 1985 season.

think I lost this out of last material -

Creel Census Method

A creel census is a systematic method of estimating the number of man-days of fishing on a body of water. Fish harvested can be estimated if the catch and length of fishing trip is determined for a sample of the fishermen. On installations with several ponds where sampling all ponds is impractical, representative ponds are selected to determine a man-days fishing per acre estimate that can be applied to other similar ponds.

The dates and times of the census are selected by random drawing. Prior to the random selection process, the number of days available for the census is determined. The more frequent the census, the more accurate the estimate of fishing and harvest. A complete census must include weekends and holidays with the type day (i.e. weekday or weekend day) estimates computed for the sample period and totaled for the final estimate. In many instances, the amount of fishing during a two-day weekend will equal the amount of fishing during the five weekdays. Alternate sample dates may be selected if there are conflicts with the scheduled dates. Inclimate weather must not be a factor in deviating from the schedule. In selecting alternate dates, the type day (i.e. weekday) must be the same as originally scheduled.

Random selection of the time of day is designed to sample the entire daylight period during a sampling period. In selecting alternate days, the same time of day as originally scheduled must be used unless a new time is selected by random method. The mean length of daylight hours must be determined for each sampling period.

The procedure for conducting the fishermen counts is to select a vantage point from which all fishermen may be observed or to count each fishermen as they are passed while traveling around the pond. The count is made on the date and at the time selected.

Mean length of fishing trip must be determined by interviewing a number of fishermen. Prior to or after the fishermen counts are conducted, a number of fishermen are asked how long they have been fishing. This period of time is recorded to the nearest tenth of an hour and is used to calculate the mean length of trip.

An estimate of fish harvest can be calculated by determining the catch per hour. During each interview to determine length of trip, the number of fish caught is recorded by species and number. Dividing the total catch by mean length of trip produces a catch per hour figure.

The calculation method is to determine the mean number of fishermen per hour by totaling the number of fishermen from all counts for a type day for the entire sampling period and dividing by the number of counts during the period. The following formula produces an estimate of man-days of fishing for a type day.

$$\frac{a \times l \times d}{E} = MD$$

when: a = mean number of fishermen per hour

l = mean length of daylight hours per day

d = number of type days in sample period

E = mean length of fishing trip

MD = man-days of fishing for type day

Totaling this estimate for each type day produces an estimate for the sampling period. The catch per hour is calculated by dividing the total number of fish caught by the number of hours fished as determined during the interviews. The catch per hour figure is multiplied by the estimate of total hours fished during the sample period to derive an estimate of total fish harvest.

When representative ponds are sampled, a man-days fishing per acre and catch per acre estimate is calculated. The per acre estimate is multiplied by the surface acreage of similar ponds to estimate the total man-days fishing and total catch for the installation.

INVENTORY PLAN

Refuge: Noxubee National Wildlife Refuge

Procedure: Number 15

Species: Beaver (Castor canadensis)

Title: Beaver Activity Survey

I. PURPOSE

Beaver have the potential to radically alter habitat on Noxubee. Beaver ponds create excellent habitat for many species, but unchecked beaver activity causes much damage. Burrowing into dikes is a constant danger and an annual maintenance problem. The refuge's 12,000 acres of excellent bottomland hardwood habitat is generally flat topography interlaced with streams. Left unchecked, beavers would flood and kill vast acreages. Much time and money are spent trying to control beaver numbers on Noxubee.

II. PROECEDURE AND DATA ANALYSIS

A. Procedure

A large refuge map will be maintained in the refuge office and plotted with areas of beaver activity. Activity is defined as dam or lodge construction, bank burrowing, stripping of bark from standing trees. The refuge forestry staff will be responsible for maintaining the map. Activity areas will be reported by refuge staff who will note these areas in the course of regular duties. New beaver ponds will also be noted during aerial flights over the refuge.

Number of beaver taken during control activities will also be plotted on the map.

When possible, mapped areas should be color coded for such variables as years and whether or not the beaver pond/hut, etc. is still active and vigorous.

B. Data Analysis

Data will be used to direct control activities and in various reports.

C. Data Filing

Refuge office will maintain map with plotted activity. Map will be located in the forestry office.

INVENTORY PLAN

III. SPECIAL CONSIDERATIONS

If possible, the beaver map should be reduced and included in the annual narrative report.

IV. MANPOWER AND COST

Personnel Costs	\$200
Equipment (aircraft)	
Other Supplies	<u>100</u>
TOTAL	\$300

Prepared By:

Jim Tisdale
Frank Bowen

Date:

10/11/85
10/15/85

Reviewed By: _____

Date: _____

Refuge Approval: _____

Date: _____

Regional Approval: _____

Date: _____